THE

Agricultural Journal

OF THE

CAPE OF GOOD HOPE.

VOLUME XXXIII.

JULY—DECEMBER, 1908.

Published by the

Department of Agriculture,

CAPE OF GOOD HOPE.

Cape Town:

CAPE TIMES LIMITED, GOVERNMENT PRINTERS.

The AGRICULTURAL JOURNAL, VOL. XXXIII.,

JULY—DECEMBER, 1908.

INDEX.

A.

B.

C.

D.

E.

F.

G.

H.

I.

J.

K.

L.

M.

N.

LIST OF ILLUSTRATIONS IN THE TEXT.

THE

Agricultural Journal

OF THE CAPE OF GOOD HOPE.

No. 1. JULY, 1908. VOL. XXXIII.

Published Monthly in English and Dutch by the Department of Agriculture and distributed gratis to bona fide farmers in the Cape Colony on application through the Resident Magistrate of the District.

SUBSCRIPTION 5s. PER ANNUM. Post Free in South Africa.

Remittances to be made Payable to the Publishers CAPE TIMES, LTD., Church St., Cape Town.

Advertising.—Approved Advertisements are inserted. Full particulars can be obtained from the Sole Advertising Contractors, THE CENTRAL NEWS AGENCY, LTD., 125-127, Long Street, Cape Town—P.O. Box 9—Telephone No. 438—Telegraphic Address: "Periodicals"—to whom also all accounts must be paid.

Postal Address:
The Editor "Agricultural Journal," Department of Agriculture, Cape Town.
Telegraphic Address: "Bulletin," Cape Town.

CONTENTS.

NOTES.

Correspondence with the Department of Agriculture.

With a view to obviating delay in dealing with official correspondence, letters and telegrams relating to matters falling under the administration of the Secretary for Agriculture should in future be addressed by the general public as under :—

I. To the Under Secretary for Agriculture, Cape Town.

Animal Diseases (other than Scab) : General administration of Acts and Regulations.
Cattle Dipping Tanks : Contributions towards construction.
Cattle Dips : Railage.
Bone-meal : do.
Scab Acts : General administration.
Insect Pest and Plant Diseases : General administration of Acts and Regulations.
Wine, Brandy, Whisky and Spirits Act and Regulations.
Fertilizers, Farm Foods, Seeds, and Pest Remedies Act and Regulations.
Fisheries.
Agricultural Shows : Grants.
Brands Act.
Fencing Acts.
Destruction of Wild Carnivora.
Destruction of Locusts.
Guano and Sealing : General administration.
Game.
Parks and Gardens : Grants.
Noxious Weeds.
Appointments and changes of Staff.
Tenders.

II. To the respective Heads of Branches.

Subjects.	*Heads of Branches.*	*Telegraphic Addresses.*
1. Animal Diseases and detailed administration of Acts and Regulations relating thereto. Stock and Stock-farming.	Chief Veterinary Surgeon, Cape Town.	Veterinus, Cape Town.
2. Insect Pests and Plant Diseases, and detailed administration of Acts and Regulations relating thereto.	Government Entomologist, Cape Town.	Entomologist, Cape Town.
3. Administration of Agricultural College.	Principal, Elsenberg College, Mulder's Vlei.	Ager, Mulder's Vlei.
4. Cereals, Manures, Management of Experiment Stations, Applications for Seeds for trial, etc.	Government Agriculturist, Cape Town.	Agriculturist, Cape Town.
5. Orchards, Pruning and Fruit-growing in general.	Horticultural Assistant, Cape Town.	—
6. "Agricultural Journal" ...	Editor, "Agricultural Journal," Cape Town.	Bulletin, Cape Town.
7. Dairying...	Dairy Expert, Queenstown.	Dairy Expert, Queenstown.
8. Wool-sorting, etc.	Govt. Wool Expert, Cape Town.	Govt. Wool Expert, Cape Town.

9. Bacteriology	Director, Veterinary Laboratory, Grahamstown.	Institute, Grahamstown.
10. Agricultural Co-operation ...	Superintendent, Agricultural Co-operation, Cape Town.	Co-operation, Cape Town.
11. "Groot Constantia," Wine Farm	Manager, Government Wine Farm, Groot Constantia.	Vitis, Wynberg.
12. Viticulture and Wine-making	Director of Agriculture, Cape Town.	Agriculture, Cape Town.

With the exception of the detailed administration of Acts and Regulations which are under the general control of the Under Secretary for Agriculture, the above subjects under this head are under the general control of the Director of Agriculture, to whom correspondence of a general nature bearing on these subjects should be addressed.

Subjects.	*Heads of Branches.*	*Telegraphic Addresses.*
13. Analyses of Soils, Minerals, etc.	Senior Analyst, Cape Town.	Neon, Cape Town.
14. Scab Acts: Detailed administration.	Chief Inspector of Sheep, Cape Town.	Acarus, Cape Town.
15. Guano and Sealing: Detailed administration.	Superintendent, Government Guano Islands, Cape Town.	—

These three subjects are also under the general control of the Under Secretary for Agriculture.

III. (*a*) To the Surveyor-General, Cape Town.

Land Acts and Land matters generally.
Mining Acts and Regulations.

(*b*) To the respective Heads of Branches.

Subjects.	*Heads of Branches.*	*Telegraphic Addresses.*
1. Mines, Kimberley, etc.	Inspector of Mines, Kimberley.	Mines, Kimberley.
2. Claims, Barkly West, etc.	Inspector of Claims, Barkly West.	Claims, Barkly West.
3. Geology	Secretary to the Geological Commission, S.A. Museum, Cape Town.	—

These subjects are under the control of the Surveyor-General.

IV. (*a*) To the Chief Conservator of Forests, Cape Town.

General Forest Administration and School of Forestry.

(*b*) To the respective Heads of Branches.

Subjects.	*Heads of Branches.*	*Telegraphic Addresses.*
1. Forests, Western Conservancy ...	Assistant Conservator of Forests.	Forests, Cape Town.
2. Forests, Midland Conservancy ...	Conservator of Forests, Knysna.	Forests, Knysna.
3. Forests, Eastern Conservancy ...	Conservator of Forests, King William's Town.	Forests, King William's Town.
4. Forests, Transkeian Conservancy...	Assistant Conservator of Forests, Umtata.	Forests, Umtata.

These Conservancies are under the general control of the Chief Conservator of Forests.

Arsenite of Soda.

Until further notice the price charged for Arsenite of Soda will be at the rate of £1 15s. (one pound fifteen shillings sterling) per drum containing 112 lbs., delivered at any of the depôts established for the sale thereof. Government Notice No. 1142 of 1907 is amended accordingly.

Suspension of Payment for Vermin Destruction.

It is notified for general information that from and after the 1st day of July, 1908, and until further notice, the payments hitherto made for the production of proofs of vermin destroyed will be discontinued.

Exportation of Ostriches and Ostrich Eggs to Mozambique.

It is notified for general information that, whereas legislation has been enacted and promulgated prohibiting the exportation of ostriches and ostrich eggs from the Province of Mozambique, except to such South African States and Colonies as have enacted similar prohibitive legislation, the exportation of ostriches and ostrich eggs to that Province is permitted.

Aid to Sheep Inspectors.

The subjoined amended regulations under Section 9 of the Scab Act No. 20, of 1894, have been approved by His Excellency the Governor, and were promulgated on the 18th ult.:—

1. For the purposes of Section 9 of Act No. 20 of 1894, every owner of sheep shall, after receiving adequate notice from the Inspector of the area, given personally or by letter either by the Inspector of the area or the Headman of the Location, as the case may be, or by some person charged by him to convey such letter, requesting him to collect or aid in the collection of his sheep for the purpose of inspection at some convenient spot, be bound and obliged to collect or aid in the collection of such sheep for such purpose, or shall, in the absence of the said notice, comply with any reasonable request by the Inspector to the same effect.

2. Every owner of sheep shall, when reporting the existence of scab among his sheep to the Inspector of the area, at the same time notify such Inspector of the number of sheep and goats in the infected flock, specifying marks, brands, etc., and distinguishing between Merinos, Cape sheep, Angoras, and Cape goats.

3. Any owner of sheep who shall contravene the foregoing Regulations or who shall wilfully furnish the Inspector of the area with wrong information shall, upon conviction, be liable to a penalty not exceeding the sum of twenty pounds.

Vacation Course in Agriculture.

The following is the list of subjects and lecturers at the Rhodes University College Vacation Course in Agriculture at Grahamstown from the 6th to the 25th instant:—I. The Principles of Agriculture. II. Veterinary Science and Diseases of Stock: W. Robertson, M.R.C.V.S., F.R.S.E., Director of the Veterinary Laboratory, Grahamstown. III. Agricultural

Chemistry: Professor G. E. Cory, M.A., Rhodes University College; G. N. Blackshaw, B.Sc., Lecturer on Chemistry, Agricultural College, Elsenburg. IV. Economic Entomology: C. W. Mally, M.Sc., F.E.S., Eastern Province Entomologist. V. Live-stock: Horses.—Claude Southey, Schoombie; Cattle.—W. H. Piggott, Highlands; Angoras.—E. K. Hobson, Graaff-Reinet; Merinoes. VI. Ostriches: Professor J. E. Duerden, M.Sc., Ph.D., A.R.C.S., Rhodes University College; Oscar E. G. Evans, Melrose, Eastpoort; L. F. Penny, Port Elizabeth. VII. Agricultural Geology: Professor E. H. L. Schwarz, A.R.C.S., Rhodes University College. VIII. Agricultural Botany: Professor S. Schönland, M.A., Ph.D., Rhodes University College. IX. Irrigation: F. C. Kanthack, M.I.C.E., Director of Irrigation; W. Ingham, M.I.C.E., Port Elizabeth; R. W. Newman, A.M.I.C.E., Irrigation Engineer, Grahamstown. X. Fruit Culture: H. H. Hards, Sunnyside, Grahamstown, and others. XI. Forestry: G. A. Wilmot, District Forest Officer and Lecturer at the South African School of Forestry. XII. Dairying and Poultry Farming: R. Silva Jones, late Government Dairy Expert.

Lectures on the Meat Industry.

The absence of any systematic instruction in connection with the meat industry has often been remarked, and, when it is borne in mind that the use of meat as food is universal, this is all the more to be wondered at. There is scarcely any trade which does not see that its members have opportunities for studying the technical details of their business, and such an industry as butter-making, which, like the meat industry, is cnly a development of agriculture, occupies the principal place in the syllabuses of our agricultural colleges. There is every reason why the meat industry in all its multifarious branches should take as high a place and should form the subject of continuous and systematic study, and at the moment there seems to be a general desire on the part of those most interested, namely, the meat traders themselves, that such opportunities should exist. There has not, however, so far, been any organised attempts to translate this feeling into a definite project, and it is therefore interesting to know that a scheme has just been arranged whereby education in connection with the meat trade will, for the first time in the United Kingdom, be placed upon an academic basis. This scheme owes its inception to Professor Robert Wallace, of Edinburgh University, and Principal of the East of Scotland College of Agriculture, Edinburgh. It is at the latter place that it is proposed to inaugurate the scheme by the establishing of a lectureship on the meat industry. This has now been practically arranged, and the lecturer appointed is Mr. Loudon M. Douglas, whose writings in connection with the meat industry are well known.

The series of lectures arranged will take place during the next English winter, and will embrace references to the history of the meat trade and its modern developments, together with detailed accounts of the various departments of the industry: the construction of abattoirs: the laws affecting the handling of meat: the diseases of animals used in the meat trade: pickling, preserving, and otherwise utilising meat, with an account of the chemistry and bacteriology of the subject. Cold storage in theory and practice will also form the subject of many references. On the whole, the course proposed will aim at giving a thorough account of the industry, so as to form an introduction to the higher study of the subject

in future sessions. As this is the first attempt of the kind which has been made, many will view it with great interest, and more especially those who may contemplate the organisation of a similar scheme in their own localities.

The London Wool Sales.

The Trades Commissioner (Mr. C. Du P. Chiappini) forwards the following report on the London Wool Sales opened on May 12, compiled by Messrs. Buxton, Ronald and Co.:—"The interval which elapsed between the close of the second series of Colonial wool auctions here on the 2nd April and the opening of the third series on the 12th May witnessed a rather sorry spectacle in all manufacturing centres, both in this country, on the Continent, and in America. Fears and tremblings as regards the future were general, weak holders were forced to sell, and nobody had a good word to say for the future. To add to the general discomfort, manufacturers and spinners of tops and yarns sat tight, and only entered the market to buy the smallest possible quantities consistent with their requirements. Merinos in consequence were badly hit, but coarse crossbreds fared worse, and at one time closely approximated to the low record prices of 1901. There were evidently those who thought there was a chance of equalling the price of seven years ago, and backing up their opinions, they proceeded to sell forward coarse combed tops at ever dwindling prices. The large quantity available for the late auctions, 263,000 bales, was moreover used as a lever for depression, and for a time it looked as if the little game of thoroughly smashing the market would be successful. At this juncture a meeting of the Wool Importers Committee was held, at which it was determined to bodily withdraw some 80,000 bales of the available quantity and carry them forward to July. This at first provoked considerable comment, but in the end proved to be a thoroughly sound and judicious step, its first result being that the 'bear' party were brought up short, and ceased selling. The week previous to the opening of the sales was marked in all consuming centres by great hesitation, and very little business was done.

"It was in circumstances such as these that the third series of sales was opened on Tuesday, 12th May. The situation being an interesting one, the sale room was filled to overflowing on the opening night, probably never before had the room been fuller. The total quantities for disposal, before making allowance for the 80,000 bales referred to above, was as follows:—Australian, 105,500 bales; New Zealand. 147,000; South African, 10,500; total, 263,000 bales. Considering the large quantity, the selection certainly was a disappointing one, and not equal to that offered during the March auctions. It is a not altogether uninteresting fact that the course of the market was almost the direct converse of that ruling during March. In March inferior greasy merino Australian wools declined more than superior parcels, now, while good wools were 1d. per lb. easier, heavy and faulty lots recovered, and not infrequently brought rather more than in March. Scoureds went the same way—the best lots ½d. to 1d. cheaper—faulty lots 1d. to 1½d. dearer. The same remark applies to cross-bred wools. Fine-haired lots, which were about the best thing to sell in March, on this occasion did not seem to be wanted, and were a full 1d. cheaper. There were, as often happens, two distinct markets for medium and coarse wools, American and otherwise. All lots suitable for American requirements were in strong request at an advance of 10 per cent. to 15 per cent. on March prices. All other lots on the opening day of the sales met a poor demand, and were quoted the best part of 15

per cent. lower. Very soon, however, the low prices brought in speculators, and the market gradually, but surely improved, until at the close the initial decline was recovered, as well as a further 5 per cent.

"At these sales close upon 6,000 bales of South African produce was brought to the hammer, as against 7,447 bales in March. The selection, however, on this occasion was not nearly so choice, and embraced a large proportion of ill-conditioned, unattractive staple. The number of clips shipped on growers' account was also in much smaller compass. In every instance, however, where these had been intelligently classed and skirted a first-class reception was afforded them, and it was a general matter of comment how vastly different competition was in these than on all ill-skirted lots. Speaking generally, opening prices denoted a fall of ½d. to 1d. per lb. for greasy wools and 1d. to 1½d. for scoureds, but as the sales ran their course prices picked up somewhat, and at the finish were not much more than 5 per cent. below closing March values. On this occasion Cape Colony, outside the Eastern District, was poorly represented, practically no good Western District staple coming on the market. A few lots of grease made up to 8d., but these, neither in style, length, or condition, could be compared to the choice lots offered in March. Scoured Westerns were also almost absent. A small choice parcel of Paarl Prize Wool made up to 1s. 10d., but fair average lots sold in the neighbourhood of 1s. 7d. to 1s. 8d. Mossel Bay wools again were scarcely represented, and call for no comment. Some fair lines of Kaffrarian grease were marketed, but nothing really choice. As a rule, these wools were rather off in condition, and did not sell above 8½d. for the best. Scoured Kaffrarians sold up to 1s. 6d. for the best, but average lots were worth 1s. 4½d. to 1s. 5d. The supply, however, was by no means large. From Port Elizabeth there were a few lots of decent Grassveld wool, which made up to 8½d. per lb., but beyond these there was scarcely anything to mention. Greasy Natal proper were not represented, but some fair lines of Griqualand East wool were offered, but being generally very badly skirted, only realised up to 7¾d. per lb.

"The Orange River Colony again offered some specially classed clips, and, as already noted, met most excellent competition. The show of these was not so extensive as in March, but for any lots of average merit 8d. to 8½d. per lb. was easily forthcoming. A small consignment of scoureds from Rhodesia was a welcome addition to the catalogues, and sold up to 1s. 4½d. per lb. The next series of sales is due to commence on the 4th July, when probably some 260,000 bales will again be available. Should the market not improve meantime it is by no means improbable that importers may adopt the same tactics as on this occasion and hold over a substantial quantity for the September auctions. This, however, will not be settled for some time yet."

Vinegar from Wine.

A correspondent writes asking how to turn wine into vinegar at short notice. The usual method practised is to take wine and reduce its strength to about 8 per cent. by volume. This is done by adding water, usually about two parts of wine to one of water. This should be placed in a cask,

which should be not quite filled. To this add one bottle of pure wine vinegar and stir well. It can then be left, and in about a month's time can be drawn off as vinegar. The supply can be kept up by adding quantities of the weakened wine to the cask—as above—as the vinegar is drawn off.

Correction.

In the article "Underground Water of Cape Colony," by Dr. C. F. Juritz, published in the June issue, the writer is made to say, on page 758, that the United States Government had spent some £500,000 sterling in agricultural research during the past 20 years. This amount should read £5,000,000.

Admission of Livestock to the Transvaal from the Cape.

It is notified for general information that livestock from the Cape Colony are only admitted into the Transvaal through the following Ports of Entry, viz.:—

Buurman's Drift, on Saturdays only.
Christiana, Daily.
Mosymiyani, on Saturdays only.
Fourteen Streams, on Wednesdays only.

Owners wishing to cross the Border at other than the abovementioned Ports must make special arrangements with the Principal Veterinary Surgeon, Pretoria, but equines doing transport work are permitted to enter the Transvaal at any point, provided the owners have obtained a standing permit from the officer mentioned.

Sale of Turkish Tobacco.

Seeing the success which attended the efforts of the experimenters in Turkish tobacco growing last season, the experiments have this year been very considerably extended. Last season about 4,000 lbs. of tobacco was grown, and this year it is estimated that there will be at least 10,000 lbs. dried and cured. It is the intention of the Agricultural Department to arrange for the sale of this tobacco, belonging to the farmers who carry out the experiments, at French Hoek on the 25th of July. Intending purchasers can get through to French Hoek by train from Paarl at 7 a.m. on that day. The sale will be held in the Goods Shed at French Hoek by Mr. Kriel de Villiers, and will be attended by several officers from the Department. Mr. Kriel de Villiers states that his terms are cash on the day of sale. All buyers of Turkish tobacco whose addresses are known have been communicated with, and any of those communicated with who intend attending the sale or appointing an agent to do so are requested to communicate with the Agricultural Department at the earliest possible date.

Crystallised Fruits.

The means of preserving fresh fruits in a crystallised form is attained by extracting the juices from fruits and replacing them with sugar syrup, which, upon hardening, preserves the fruit from decay, and at the same

time retains their natural shape and, to some extent, flavour. The process is as follows:—Fresh fruit, nearly ripe, whole, or cut into quarters, as in the case of citrus and such large sorts, should be boiled until they are soft enough to be handled without breaking; in the case of citrus fruits, the rind having previously been lightly pared off and the pulp removed, for a couple of hours at least; the softer kinds, such as peach, plum, apricot, etc., would merely be steeped in boiling water for a very short time, care being taken that they are not immersed sufficiently long to be anything like cooked. The exact time can only be determined by actual experience. After this the water from the fruit should be allowed to drain off thoroughly, and when sufficiently dry, they should be placed in hot sugar syrup and kept there for a few days, so that the sugar may enter the fruit cells and displace what juice remains after the boiling or scalding process. The fruit should then be lightly washed in clean cold water and packed in dry write sugar, while wet, and allowed to remain there and dry off, in a draught, until it is hard enough to be packed away for transport. A common home recipe for preparing sugar syrup is:—One pound white sugar to one pint of water, adding the white and shell of an egg to every four pounds of sugar; boil this mixture over a fast fire for twenty minutes and strain through a cloth while hot, when it is ready for use.—E. P.

FARM AND VELD.

Scab Spread by Birds.

Mr. H. Francis, of Steynsburg, writes:—There has never been much love lost between farmers and the house-sparrow. It may be news, however, to some of us that he is a very probable spreader of scab, and possibly the cause of many an outbreak or reinfection which hitherto has been unexplained. I myself have no goats. Subsequently to those of my neighbours being shorn, I happened to examine some sparrows' nests which some small boys had raked down from the rafters of my sheep-shed and littered all over the floor. I found them to be constructed largely of mohair sweepings. My nearest neighbour's shear-shed is at least a third of a mile away. The inference to be drawn from this little story is obvious enough, but the moral of it is quite another matter.

Syphons on Boreholes.

Mr. E. C. Kemp, of Bellrock, Cathcart, writes:—"Can you or any of your readers give me any information on Syphoning? I have a bore-hole which is well suited for a syphon pump. I have the piping and all necessaries erected but cannot get it to work for more than 15 hours. The bore-hole is 28 feet deep, put down between two dolerite reefs, which are about 200 yards apart, where the syphon is erected. The water rises to within 13 feet of the surface, and is composed of two streams, one being 14 feet 6 inches and the other 17 feet from the surface. There is no other rock visible in the bore-hole, with the exception of the dolerite, which was struck at a depth of 28 feet. The discharge pipe has a fall of 24 feet. The whole length of piping is 290 feet. The water is calculated at 10,000 gallons in 24 hours. The piping used is 1¼ inch, with suction valve at foot of piping in borehole, with air chamber on top, and valves. I may mention that I have taken off the air chamber and all valves on top with far more success than otherwise."

Mr. F. E. Kanthack, Director of Irrigation, supplies the following memorandum in reply:—"In the conditions named one would not expect the syphon to work continuously for a very long time. The discharge pipe has a fall of 24 feet, and at the elevation of Cathcart this must approach very nearly the atmospheric pressure. The lift also, 13 feet, as a minimum, is high, so that the pressure in the pipes at the summit must be low and air will readily separate from the water and interfere with the flow. It is not stated whether the water level in the bore-hole falls after the syphon has been working for a time, but it is possible that it does, and so makes the conditions still more unfavourable even if the end of the pipe does not become uncovered. The discharge of 10,000 gallons per 24 hours

is said to be 'calculated,' but I assume that it is the actual discharge as *measured*. It appears to be about the maximum quantity which the pipe will discharge and it is possible that if the discharge were reduced somewhat by placing a stop cock towards the lower end of the pipe and partly closing it, the flow might continue for a longer time. I do not know of any very satisfactory air chamber for use with syphons. Perhaps the simplest method is to place a small pump on a stand pipe at the summit of the syphon, with a cock on the stand pipe. The pump could be worked for a few minutes to remove any air which accumulated and interfered with the flow of water. With this arrangement it would be better to have the outlet end of the pipe immersed in water. When the pump is to be used the cock would be opened, and a few strokes made with the pump until it discharges water only at the spout. The cock would then be closed and the syphon would operate until air again accumulated."

Ixodes Pilosus Tick and Paralysis.

The following letter brings up the old but still unsolved question of whether or not the Russet Tick (*Ixodes pilosus*) is really responsible for causing the paralysis of sheep so commonly attributed to it by farmers in several parts of South Africa. Most of the complaints have been from the Fish River Rand and the Albert district of the Colony, and from about Thaba 'Nchu of the O.R.C., but the present one is from the heart of the Karoo (Zaai Plaats, district Sutherland). Specimens of the tick were sent to the Government Entomologist by the correspondent for identification and with the query, "Is this tick poisonous?" Later the letter here given was received:—"I beg to thank you for your letter and explanation. Experience and investigation has clearly proved to me that the tick is poisonous. The spot where the tick fastens on the sheep gets badly inflamed for about three inches in circumference. Then on killing the sheep I find the flesh at this spot also inflamed, and that after being exposed to the air it turns bad. Even in winter it will not keep good for twenty-four hours. The tick causes paralysis most when it fastens on the neck of the sheep. If seen in time and washed with dip, the tick leaves and the sheep recovered; but if the tick has penetrated through the skin (of which I have seen several instances) the sheep generally dies as the dip does not then penetrate to the tick to kill it. In winter time the tick seems more poisonous than at any other season. I have cured some very poor (bad conditioned) sheep by washing them with dip when they have been too weak to put them into the dipping tank. I think that if this method of getting rid of the tick were more generally known, we would hear less of dronkziekte (paralysis) in sheep, especially in grassy districts. Of late years, say three or four, the tick is more prevalent than it used to be, and if it is not taken in hand it is bound to cause much loss in the future.—E.D."

Sandcrack.

A correspondent writes asking for the best treatment for sandcrack in the hoof of a horse. The following is the treatment recommended by the late Mr. D. Hutcheon:—"The first thing is to clean out the crack, and remove carefully all sand or dirt which may have got into it. If the crack is in the toe of a hind foot, get a shoe made with two toe-clips, one on each side of the crack, and fit the shoe in such a manner, by reducing the wall of the hoof, that the toe does not rest on the shoe underneath the

crack. If the crack is in the inside quarter of a fore foot, put a bar shoe on, removing the bearing off the foot immediately under the crack in the same manner. If it can be done satisfactorily, put a clip on the bar shoe, to clasp the hoof immediately behind the crack; at any rate, in all cases remove the bearing from under the crack. If there is acute pain and lameness, place the foot for some hours in hot water, and see that no dirt or matter is left in the crack; it may be necessary to pare out the edges of the crack to do this. After keeping the foot as long as possible in hot water, place it in a hot poultice, and keep up the poulticing until the pain and lameness have ceased. After that is accomplished the next consideration is how to arrest the further continuation of the crack from the coronet; the crack will not unite, and unless it is stopped at the toe, it will continue a crack. There are various methods adopted for doing this, the common one in the Colony is to fire a straight line across the crack at the top, but unless the crack is completely obliterated at the coronet, this plan does not succeed. A very simple plan is to cut out a V-shaped piece of horn at the top of the crack. With a fine-pointed drawing knife make two grooves like the letter V, the apex of the triangle is in the crack, about 1½ inch from the top, while each limb is about ¾ of an inch on each side of the crack at the coronet. After having cut out this triangular groove with the knife, cut out the whole of the horn within the triangle, removing every appearance of the crack, from the coronet down to the apex. This will necessitate the careful paring off of the whole of the horn down to the quick, but do not make it bleed, if possible. Then heat a firing iron, and with it fire the edges of the V, especially at the apex, where you must completely separate between the open crack below and the part which is cut out above.

"Care must be exercised not to go too deeply and thus pierce the sensitive laminae, it is better to repeat the operation a week later, rather than go too deep at first, still, go as deep as possible, as a complete separation has to be made, or the crack will extend up again. After having done that, rub some cantharides blister on to the coronet, to stimulate the growth of healthy horn, and give the horse a rest for a week or two. Make sure afterwards that the horn is growing down whole from the coronet, and that there is a complete separation between the crack and the triangular part which is cut out. I have never failed in completely curing a crack by this method, and I have never stripped off the horn completely, as is recommended in many books. If a crack is noticed in time, before it has extended far down the wall, or deep through the horny laminae, all that may be necessary, is to draw the firing iron right across the crack about a quarter of an inch from the coronet, and then cut the horn completely out immediately above it. No crack should be left above the groove made by the firing iron, the horn must grow down whole from the coronet. Nailing and clasping the cracks are successfully done, but these operations require some skill, and those who can perform them require no advice from me."

Foot Rot in Sheep.

Correspondents are again asking for information as to the best treatment for Foot Rot in Sheep. The late Mr. D. Hutcheon, in writing on this subject, stated:—The curative treatment of foot-rot is very similar whatever the cause may be, and is somewhat as follows:—Pare down the

sole of the foot to its natural size and shape. Carefully examine every part of the hoof for thorns, or any foreign body, and clean out thoroughly any dirt or diseased products found in the cleft between the "klouws." With a sharp knife carefully remove any loose or separated horn, which would be likely to retain dirt or purulent matter, but avoid making the parts bleed. In those cases in which matter is burrowing round the coronet, the pipes or sinuses should be carefully opened, all matter cleaned out, and the diseased surface dressed with a mixture consisting of 4 ounces each of Alum and Bluestone, dissolved in a gallon of hot water. If there is proud flesh (granulations) these should be dressed with Butter of Antimony. For ordinary cases, mixture of finely powdered Bluestone and Stockholm Tar makes an excellent dressing. Where large flocks have to be dealt with, the sheep are driven through a properly constructed trough, containing a strong solution of any of the Tar or Carbolic Sheep Dips. Affected sheep should be placed on dry ground as far as possible. Some recommend placing a quantity of finely powdered lime on a dry floor and driving the affected sheep over that every second day. *Prevention.*—This consists in paying proper attention to the feet, and running the flock through dip, at intervals, during the season when the disease is prevalent.

Thoroughbred Poultry versus Crossbreds.

"Colonist" writes:—"Many farmers have great faith in cross-bred poultry and condemn anything thoroughbred, looking upon same as being of a delicate nature and only fit for the show-yard. It will therefore probably do some good if we consider for a little while what the idea of creating a thoroughbred is, and then compare it with the ideas of cross-breeding. Any breeder of note when he starts operations and makes up his mind to raise thoroughbreds, considers carefully what the goal is that he desires to reach, and having decided, he always keeps that goal constantly before him. No matter what he intends to breed, whether cattle, sheep, horses, pigs or poultry, the same process has to be gone through. Having decided on the animal or bird, and fixed the goal firmly before his mind's eye, he commences breeding, noting carefully all the points of the different sexes he is using, and each season he carefully considers the results of his mating, and notes the various improvements or otherwise. He thus forms the basis for each coming season's work. The process is sometimes long, and to reach anything near perfection may take several seasons, but with each difficulty overcome fresh interest and enthusiasm is aroused and the work becomes the greatest pleasure of the breeder's life. When the goal is reached and the thoroughbred is perfected to the extent that in future matings the result is definitely known then the joy and satisfaction are intense.

"In cross-breeding, each season's work is a gamble or speculation. There may be improvement, there may be otherwise; nothing is definite, and of the future nothing is known with any degree of certainty. Anyone can breed for any object he wishes, providing he takes sufficient trouble. Let us consider poultry, for instance. One can produce beautiful plumage, large birds, good layers, and it is possible to keep the birds in most instances perfectly strong and full of vigour. But it is easier to breed for one object alone and hence we find frequently birds with perfect plumage, but poor layers and very delicate; birds also of great size sometimes of good plumage, but very poor layers; and again we find birds splendid layers, and both small and of inferior plumage. It is most in-

teresting to see the breeders of each class of bird together as each condemns the other, and each considers he is doing the most good for his fellow-man. I am afraid, however, that this method of breeding for one object alone is doing a lot of harm, for not only with poultry but with all classes of stock a definite all-round standard of perfection is required. It may take longer to reach such perfection, but when it is accomplished the value is immense, not only to the individual, but to the country at large.

"Thoroughbreds are required, but they must be bred for certain definite combined qualities, and the basis to build on must be constitution It is useless producing any stock that is delicate, no matter how beautiful or useful they may be otherwise. Show stock that have been pampered to produce beauty or exceptional size, have been a pest to our Colonies and have done the encouragement of thoroughbred breeding a fearful lot of harm. It is a pity that judges are not more particular, but perhaps the authorities ought to be more particular in appointing competent judges and creating definite standards of merit with constitution as the basis.

"It is a matter that needs very careful consideration, as each year that passes is a serious waste of time. Our Colonies must go ahead and work on a definite basis, and thus each year must see our united efforts approaching nearer the goal of perfection. We have numerous advantages, and we should make use of them to produce not only sufficient for ourselves but sufficient of first-class quality to export, and compete, and beat other competitors. Don't let us worry because we have not the opportunities of our neighbours, but make up our minds to definitely advance each year, and our reward is certain. If we beat ourselves each season we shall eventually beat our neighbours, and all we have to do is to make the most of the opportunities we have, and success will be bound to come."

The "Persimmon."—Diospyros Kaki.

This delicious subtropical fruit, which has come into fashion so much of late, grows freely in well-cultivated soils along our coast region. It is deciduous, casting its leaves during the winter months, and is clothed with an abundance of large dark coloured leaves until they fall, when the bright coloured fruits, clinging to the branches on strong stems, are seen to advantage. Any fair soils are suitable for carrying the Persimmon. Grafted trees only should be planted; and these should be put in fifteen feet apart and treated as any ordinary fruit tree. Being greedy feeders, they require a liberal amount of manure. Pruning, merely to shape and balance the tree, is done during the winter months. At the fruiting stage the leaves appear first and the fruits show later on, when the mid-branches have been formed. The fruit, like many varieties of this nature, should be gathered when fully developed, and ripened indoors on straw. Grafted trees of the best known sorts can be obtained from Costa Bros., of Plumstead, who have made a speciality of growing this fruit and propagating young stuff for sale. Their graftings have been inspected and can be strongly recommended.—E.P.

Gardening Notes.—July.

The ground and atmosphere is usually so cold and wet in the West during this month that it is only on high and dry aspects that one could recommend the sowing of any vegetable seeds. Such as are put in now will make little headway even if they survive, and will easily be caught up by the later sowings. Thinning of standing crops may be done and the drainage of the land attended to. Wind-breaks of rye may be sown on lands, subjected to the high winds in early summer, when gourds and other vegetables are to be planted later on about the end of the month. Raised beds made on the top of fermenting manure in pits may now be prepared in sunny sheltered spots and early marrows sown. The seed should be put in rather thickly and the weakest weeded out, retaining only sufficient to produce a strong healthy growth. The thinnings should not be done until the plants have made their second pair of leaves. Spinach should be sown on well-drained land and lettuce plants set out from the seed beds.—E.P.

Smyrna Figs for Drying.

The introduction of the fig-fertilizing insect, dealt with at length in the May issue, appears to be a success. A goodly number of caprifig fruits containing the insects are now on the trees at Elsenburg, and even should they perish, this year's experience has shown that the procuring of supplies for re-establishing the creature from oversea is an easy matter. Under the circumstances this Department feels justified in strongly recommending the planting of figs requiring caprification, for drying purposes. A limited supply of cuttings from trees of the true Smyrna drying fig and the wild or caprifying trees, required for sustaining the insect, imported by the Government some years ago, are available for distribution at 15s. per hundred. The capri figs are of three kinds, all of which should be planted. Applications for these are invited and should be addressed to the Horticultural Assistant, Agricultural Department, Cape Town. Not more than 100 cuttings of the drying figs, now called Calimyrna, and 36 altogether of the Capri figs will be allotted to one applicant, and preference will be given to parties desiring to plant them where fig culture would be successful. The Capri trees should be planted as a thicket or hedge. Further information will be furnished on request. The cuttings will be ready for issue at the end of July.—E.P.

THE FUSICLADIUM DISEASE OF THE PEAR AND APPLE.

WITH NOTES ON OTHER SPOT DISEASES OF THESE FRUITS.

By Chas. P. Lounsbury, Government Entomologist.

Summary of Article.

Fusicladium and likewise "Black Spot" and "Scab" are names used in common for a serious fungous disease of the apple and a distinct but very closely related disease of the pear. Fusicladium it is that causes the spotting of the Late Bloomer apple in many Eastern Province orchards and the shy bearing of the Saffraan pear in the Western Province. Of late seasons, it has attracted considerable attention on Williams' Bon Chretien and other popular, high-priced pears, large quantities of these being distorted or disfigured by it. Some varieties are particularly subject to attack, while others suffer very little even in seasons when the disease is most prevalent. Cool, moist weather, especially about the time of blossoming, favours the trouble. It is chiefly an early spring disease in the Southwestern districts, and a summer disease in eastern parts. Extensive experience in other countries has demonstrated that injury to the foliage and fruit can be almost entirely prevented by timely spraying with Bordeaux mixture. Applications after the spots appear do little good compared with applications made between the time the buds begin to burst and the unopened blossoms begin to show. Arsenate of lead and many other preparations, which are excellent against insect pests of one kind or another, are useless for the prevention of Fusicladium. Bordeaux mixture, however, may be applied in connection with arsenate of lead and Paris green. The trouble should not be confused with Bitter Pit in apples.

Explanatory.

This article deals with two fungous diseases, one of the apple tree and its fruit, and the other of the pear tree and its fruit, that are of growing importance in Cape Colony. They were discussed in an article which appeared in the August, 1905, issue of the *Agricultural Journal*, but owing to representations from the Western Province Horticultural Board, prominence is again given to them. In the absence of any mycologist in the Government service, the account that follows was prepared by the Government Entomologist. For the most part it is a compilation.

Fig. 1—Pears from Constantia, spotted, deformed and cracked by Fusicladium natural size.

Name.

The fungus responsible for Apple Fusicladium is *Fusicladium dendriticum*, which is a stage in the development of *Venturia pomi (inaequalis)*, found in decaying apple leaves. That responsible for Pear Fusicladium is *Fusicladium pyrinum*, which is a stage in the development of *Venturia*

pyrina. Some botanists have considered the two fungi identical, and for convenience, in this article, they will be discussed together, but it should be remembered that the two are really distinct. The pear trouble may occur where the apple trouble does not, and *vice versa*. Two years ago the Transvaal Plant Pathologist, Mr. I. B. Pole Evans, studied abundant material of both diseases sent to him by the writer from different parts of the Colony, and was unable to find any of the pear fungus on apples or any of the apple fungus on pears, although he examined affected specimens of apples and pears from neighbouring trees. In a published report (*Transvaal Agricultural Journal*, July, 1906), he figures and describes certain constant differences between the two fungi. To the unaided eye, however, the two are much alike, and they are favoured by the same climatic conditions and controllable by the same measures. In America the terms Apple Scab and Pear Scab are used to designate the trouble, whilst in Australia the name Black Spot is generally applied. The use of these names should not be encouraged in South Africa, as they tend to promote confusion with other fruit diseases.

Fig. 2—William's Bon Chretien Pears from Stellenbosch, spotted and deformed by FUSICLADIUM ; natural size.

Appearances.

Fusicladium attacks the fruit, leaves, and young wood. The accompanying illustrations, which, with one exception, are from photographs of Cape raised fruit, tell better than would words the general appearance of the trouble on the fruit. The injury to young wood generally escapes notice. It shows as discoloured areas and small swellings and breaks of the bark, and it is now believed that the infection of the foliage and fruit in the spring starts from these places. On the fruit the trouble first shows as small, almost black, velvet-like spots. These spots enlarge as the disease progresses from the point of infection, and may become half an inch in diameter. Several often run together and produce a large blotch. The fungous growth does not penetrate deeply, but extends just under the skin, which dies and breaks away as the disease advances. On apples a ragged margin of the dead skin, pale in colour, often surrounds the diseased spot, giving it a charasteristic appearance well shown in the illustrations. The writer has not noticed such a border in the case of any pear, and it is also lacking from the spots which form on the leaves. The leaf spots may be seen before the velvety stage is reached if inspected leaves are held to the light. The upper surface of the leaf over the spot bulges slightly as the disease develops and the dark velvety growth appears in the slight hollow which forms on the under side. The velvety growth consists of the spores or reproduction bodies of the fungus. It disappears gradually and leaves a roughened, scabby surface on the fruit or a dead spot in the leaf. Fruit that is attacked at an early stage may become much deformed as a result; this is particularly true of some varieties of pears. By the time such fruit ripens, the only indications of the disease left may be a russet, scabby surface in blotches where the development is imperfect. In severe cases fruit may crack.

Damage Caused.

The damage may be much or little, involving severe injury to the tree and the total loss of its fruit or no material injury at all, according to the severity and time of the attack, which in turn depénd chiefly upon climatic conditions. It is not at all uncommon, in some countries, for the disease to be extremely bad in one season and scarcely noticeable in the next. The complete defoliation of the trees sometimes occurs in some over-sea places, and then the injury may be apparent in the size of the crop of several future years, although during them the trees show little of the disease. Often the crop is not much reduced in extent, but suffers considerably in quality. Although, unlike in Bitter Pit and Codling Moth injury, the blemish is usually confined to the surface and is removed when the fruit is pared with little or no loss of the flesh, it seriously affects the market value of the fruit.

Conditions which Favour.

The disease thrives best in cool, damp weather, and is worst when a wet spring is followed by a cool summer. A great deal probably depends upon the nature of the weather at the time the fungus develops its first spores in the spring. If the weather is then such as to enable the infection to get established at many points, the disease seems to respond far more readily than otherwise to favouring weather later on in the season. Hot, dry weather is an effectual check on the germination of the spores and hence on the formation of new spots, but spots already established appear able to extend themselves to some extent and to furnish fresh spores when favourable conditions recur if the interval is not too prolonged. Trees which grow in dry, well-ventilated situations are naturally less subject to attack than

those which grow in low-lying, much sheltered, moist situations. Because the atmosphere amongst the trees is naturally cooler and more humid, old orchards tend to suffer more than young ones.

Fig. 3—Pear Leaves from Cape Town suburbs, spotted by FUSICLADIUM.

OCCURRENCE IN CAPE COLONY.

Information from old people leads the writer to believe Pear Fusicladium to have been present about Cape Town and Stellenbosch for nearly half a century, if not longer, and it is probable that few, if any, towns, unless it be in the driest parts of the Karroo and northern districts, are now free of it. Its introduction into many places, however, has probably been within the last dozen years. For instance, it seems to have been noticed at Uniondale for the first time in 1905, and it is said to have been at Avontuur, over the mountains from Uniondale, for only three years longer. Swellendam, George, Oudtshoorn, Graaff-Reinet, Uitenhage, Grahamstown, King William's Town, and Queenstown have all been infected for many years.

The Apple Fusicladium appears to have a much more limited distribution. It has been recognised on trees in the Albany, Bathurst, Fort Beaufort, Victoria East, King William's Town, and Komgha districts—all in the summer rainfall area of the Colony. Elsewhere it has been observed only in one garden near Stellenbosch. The Pear Fusicladium is particularly bad in the same garden, and it was at first thought that the spots found on the apples might be of the pear and not the true apple disease, but a study of the fungus by Mr. Pole Evans dispelled the doubt. Infected apples were

found there two years ago and again last year, but none were seen at an inspection in the season just past. Only a few fruits were infected, and the spots were all small. For three seasons the writer has been on the look-out for the disease on Western Province apples exposed in Cape Town shops, but on no occasion has he seen a spot. The disease has been rumoured to be prevalent in Somerset West, Caledon, and other places, but enquiries have shown the rumours to be based on the occurrence of Bitter Pit or other distinct trouble. However, it is quite probable that the disease exists in numerous places, particularly old gardens, in the south-western districts, and that it escapes observation through the absence of conditions favourable to its development. That the pear species should develop where the apple species does not may, perhaps, be explained by the relative lateness on the part of the apple tree in starting into growth. The fruit and foliage of early starting pear trees have been found badly affected before apple trees in the vicinity have opened a bud.

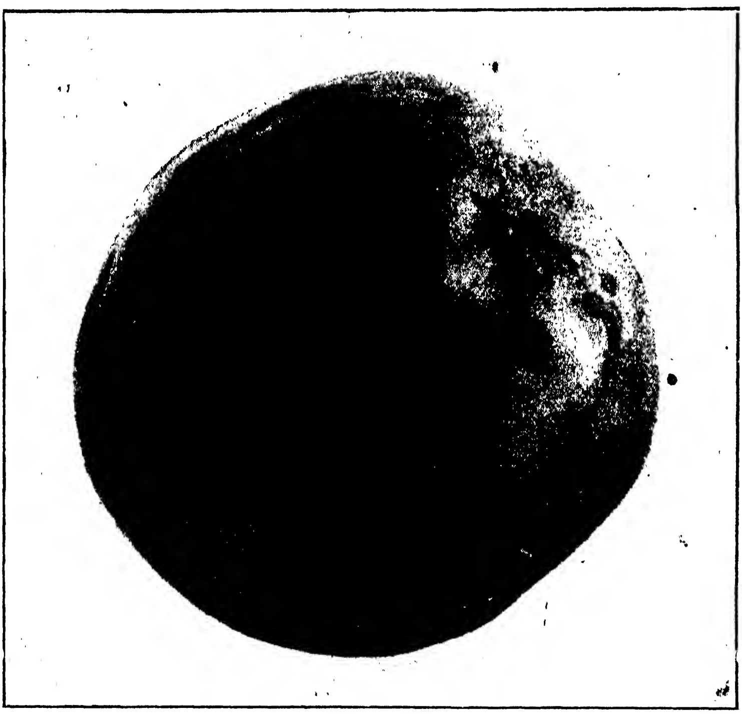


Fig. 4—Apple spotted and cracked by FUSICLADIUM.
Specimen from Kent, England, out of a consignment excluded at the Port of Cape Town.

Those acquainted with the climatic conditions which prevail in the various rainfall regions of the Colony will deduce from what is stated above that Fusicladium is chiefly a *summer* disease in eastern districts and chiefly a *spring* disease in south-western districts, and that it is not to be dreaded in dry inland parts. Experience is already showing that, as recorded for other countries, there may be much more trouble with it at a given place in one season than there is in another. The damage done in the eastern districts during the season just past was trifling to that done in the previous season, when in exceptional instances crops were utterly ruined. Great

variability is not to be expected in the south-western fruit districts, as the spring and summer climatic conditions are much the same in one year as in another, but the seriousness of the disease in pears appears to be gradually increasing from year to year. As yet the majority of fruit-growers do not know the disease, or know it only in old trees which they do not value. It seems reasonable to suppose, however, that spraying with a fungicide to control the trouble will soon be advisable in the case of the more susceptible varieties in many of the extensive orchards planted ten to fifteen years ago. Up to now these orchards have shown the disease only to a slight extent, if at all; but each year the conditions in them tend to become more favourable for the fungus by reason of the denser growth of the trees, and more and more infection must be expected to survive in them over each succeeding winter, and be ready to respond to the favourable climatic conditions that are practically certain to prevail in the spring.

How Fusicladium Spreads.

The velvety growth on the blackish spot indicative of the disease consists of numerous erect branches of the fungus, each of which grows a spore or reproductive body at its summit. Many thousands of spores may be produced from a single spot, and any one is capable of starting a new growth of the fungus. They are easily broken off, and by one means or another they get scattered widely, while so innumerably are they produced and so diverse and uncontrollable are the accidental means which spread them about, that under favourable atmospheric and other conditions the disease may pass rapidly from tree to tree, orchard to orchard, and probably district to district. Trees in all stages of growth are attacked, including nursery stock; and it was doubtless seedling stocks and young trees that spread the trouble to this and other countries. Young trees might appear quite healthy, even to a practised eye, when planted and yet harbour the fungus in the bark. It is now generally accepted that the infection of the new growth in the spring depends chiefly on spores which develop from fungus which has survived in the twigs of the same tree during the winter. These spores burst through the bark in the spring, and sprout when sufficient warmth and moisture become present. It has been found that the spores sprout and grow readily at a temperature of 50° F.; and this explains the rapid development of spots on pears in the cool, damp and early spring of the south-western coast districts.

Varieties Affected.

It is a remarkable fact, which as yet seems to have received no fully satisfactory explanation, that most diseases of plants far more seriously affect some varieties of the host than they do other varieties. This is the case with Fusicladium, as regards both pear and apple.

The variety of pear which suffers most from Fusicladium in Cape Colony seems to be the Saffraan. This old-fashioned variety starts into growth very early, and it is no infrequent occurrence in some places for the fungus to attack the stems of the blossoms and young fruit, and cause the dropping of almost the entire crop. The Williams' Bon Chretien (Bartlett) is also very susceptible, and it is to be feared that this popular variety will suffer severely as the trees become older. The fruit spots early in its growth and commonly becomes deformed. Other varieties which have been observed to take the disease badly in the Cape and Stellenbosch districts are Winter Saffraan, Jargonelle, December, Winter Nelis, Louise Bonne, Glout Morceau, and Chaumontel. The Beurré Bosc and Duchess d'Angoulême also get affected, but in a slighter degree. The late Hon. Wm. Rogers,

M.L.C., grew 56 varieties of pears at his farm in the Cathcart district, near the Katberg, and reported that of these he found Fusicladium only on the Bergamot, Glout Morceau, Leo Gregoire, Beurré d'Aremberg, and Marie Louise. The last was least affected. Mr. H. G. Flanagan, of Komgha, states that in his orchards the worst attacked varieties are Williams' Bon Chretien, Beurré d'Amanlis, B. Bosc, B. Diel, B. Hardy, Easter Beurré, Winter Nelis, Saffraan, and Calabash. Less attacked varieties with him are Fertility, Winter Bergamot, Gansel's Bergamot, Hampden's Bergamot, Grand Soleil, Marie Louise, and Jargonelle; while the New Year, Kieffer, Le Conte, and River's Beacon appear to escape attack. E. S. Salmon, the botanist of the South Eastern Agricultural College, Wye, England, mentions (*College Journal* for July, 1906) that he found the disease very badly in the wood of Doyenne du Comice, Marie Louise, and Jargonelle. He also found it in the wood of Beurré Diel, Beurré Bosc, Le Lectier, Doyenne Boussoch, Clapp's Favourite, Pitmaston Duchess, and St. Germain. D. McAlpine, the plant pathologist of Victoria, Australia, gives the Williams', Beurré Bosc, Beurré de Capiaumont, Citron des Carmes, Vicar of Winkfield, Pitmaston Duchess, and Bailey's Bergamot as the most affected.

The popular Late Bloomer is the variety of apple most affected in the Colony. It suffers very severely in some eastern orchards. The Tom Putt, Irish Peach, Reinette du Canada, and Ohenimuiri also suffer to some extent near Grahamstown. The English botanist mentioned found the fungus on the wood of Yellow Ingestre or Summer Golden Pippin, Lord Suffield, Ecklinville Seedling, and Cox's Orange Pippin very badly, and less badly on Wellington, Cox's Pomona, Warner's King, Mr. Gladstone, and Councillor; and he says that it has been reported to him that the fruit of the following varieties became very seriously spotted:—

King of Pippins,	Lord Grosvenor,	Ecklinville Seedling,
Worcester Pearmain,	Suffield,	Loddington Seedling,
Cox's Pomona,	Domino,	Yellow Ingestre.
Northern Greening,	Wellington,	

And these less seriously:—

Duchess Favourite,	Blenheim Orange,
Quarrenden,	Warren's King,
Allington Pippin,	Cox's Orange.
Bismarck,	

The Victorian plant pathologist lists the worst varieties as the following:—

Ben Davis,	Munro's Favourite,	Shepherd's Perfection,
Cleopatra,	Newtown Pippin,	Stone Pippin,
Dumelow's Seedling,	Pomme de Niege,	Sturmer Pippin,
Gravenstein,	Ribston Pippin,	Yates,
Irish Peach,	Scarlet Nonpareil,	Rokewood.

The common varieties which suffer worst in the United States are said to be:—

White Winter Pearmain,	Newtown Pippin,	Red June,
Northern Spy,	Baldwin,	Early Harvest,
Fameuse,	Astrakan,	Rome Beauty.
Yellow Bellefleur,	Winesap.	

It is questionable if any variety of apple or pear is absolutely immune to the disease, and the varieties most attacked at one place are not always those most attacked at other places. For instance the Gravenstein and Ben Davis, which are given as amongst the worst in the Victoria list above, have the reputation of being amongst those not much affected in America.

The Kieffer is considered the most resistant pear. Professor Salmon, in the English article above mentioned, says the following varieties of apples stand out as resistant to the disease: —

Beauty of Bath,	Grenadier,	Queen,
Bramley's Seedling,	Lord Derby,	Victorian,
Newton Wonder,	Lane's Prince Albert,	Golden Spire.

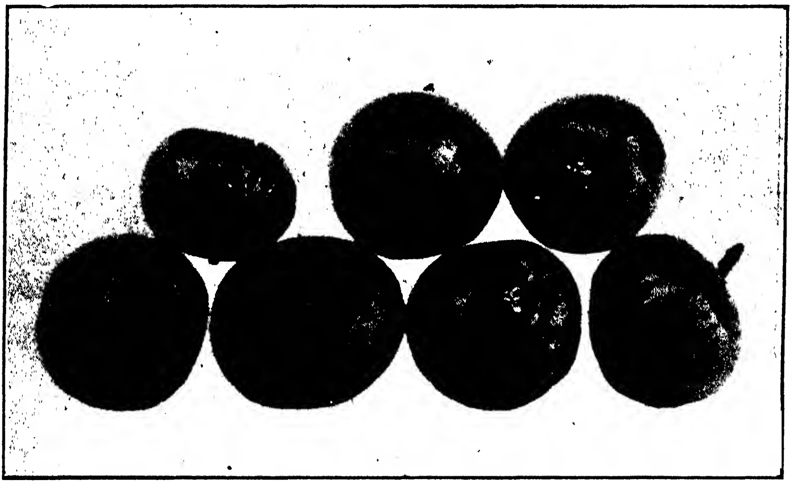


Fig. 5—Late Bloomer Apples from Komgha, attacked by FUSICLADIUM; natural size.

And Professor McAlpine, the Victorian authority quoted, gives the following as the "least affected" apples: —

Cox's Orange,	Johnathan,	Rome Beauty,
Duchess d'Oldenberg,	Pioneer,	Rimer,
Five Crown,	Reinette de Canada,	Statesman.
Hoover,		

In the United States, Grimes Golden, King of Tompkins County, Johnathan, Ben Davis, Rhode Island Greening, and the Russets are reputed to be little troubled.

These lists are given for the satisfaction of those who may be about to plant trees and want such information. It is regretted that they are incomplete and somewhat contradictory, and that they fail to mention some varieties which are popular at the Cape. Pickstone gives Ohenimuiri as another name for Munro's Favourite, and Wemmer's Hoek as Late Bloomer. No grower should choose or reject any variety for planting chiefly because of its behaviour as regards this disease. Other diseases may deserve more consideration. For instance, an apple which takes Fusicladium badly is preferable to one which takes Bitter Pit badly, for Fusicladium can be controlled while no remedy for Bitter Pit is known. Even as regards Fusicladium greater reliance should be placed on local experience than on the above lists, providing always it is certain that the disease occurs locally. The many good qualities of the Late Bloomer probably much more than offset its sensitiveness to the trouble.

"BITTER PIT."

Bitter Pit is commonly confused with Fusicladium, and, therefore, deserves some mention in this article. The accompanying illustrations show its general appearance. The Department of Agriculture arranged two

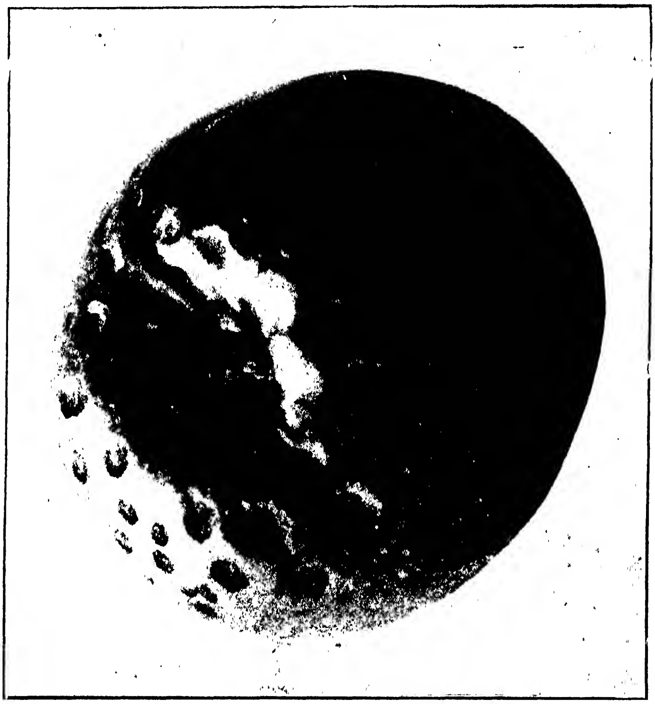


Fig. 6—Versfeld Apple, from Hex River, spotted by BITTER PIT: natural size.

years or more ago for a scientific study of the trouble by Mr. Pole Evans, the Transvaal Plant Pathologist, with a view to ascertain its cause and what means, if any, can be employed to prevent it. Mr. Pole Evans has not yet submitted a report, but one is expected before many months, and as it will doubtless be published in the *Agricultural Journal*, only a few general statements are admissible now. The name "Bitter Pit" was given to the trouble in Australia. It is a misleading term, as there is seldom any bitterness about it, unless it is in the mind of the unfortunate owner. He may have a crop of apples, which was practically clean at the time of picking, become so badly spotted in a few weeks as to be almost unsaleable. The writer considers Bitter Pit much the worst trouble against which Cape apple growers now have to contend. It appears to be independent of any

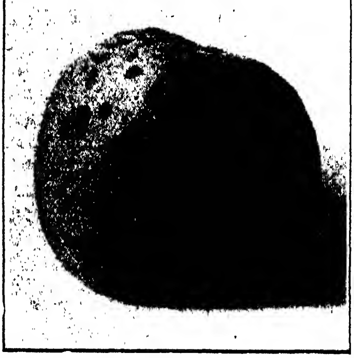


Fig. 7—Stellenbosch grown Apple, spotted by BITTER PIT; natural size.

fungus or other disease-causing organism, and to be due solely to physical conditions in the environment of the tree unfavourable to perfect development of the fruit. It is of widespread occurrence in Europe, America, and Australia, but seems to be especially troublesome in South Africa. Fortunately some excellent varieties of apples remain free, or practically free, of the defect even in the localities where greatest loss is experienced with other varieties, and in the extension of apple culture resistant varieties should be favoured and much affected ones rejected. The first outward indication of the trouble is the appearance of roundish discoloured areas. These gradually darken and become more or less depressed and pit-like. The skin remains unbroken, and it is evident that the trouble is under the surface, and not on it, as in the case of Fusicladium. On cutting into a discoloured area, the pulp beneath it for about an eighth of an inch is found to be brown, dry, and tough, a condition quite absent with Fusicladium. Scattered through the pulp similar brown spots may be found, particularly in certain varieties. The spots usually occur on the blossomed-end half of the fruit, and when viewed from the stem badly spotted apples often appear quite clean. Fusicladium spots are more generally distributed. Then Bitter Pit seldom shows until the fruit is approaching ripeness, and often does not become evident on the surface until the fruit has been kept a fortnight or longer. Fusicladium may appear early or late, dependent on the weather, but it extends very little when at all on stored fruit.

Fig. 8—Sections of Apple to show Bitter Pit spots in the pulp; natural size.

Entomosporium Spot.

Fusicladium on pears is often confused with a spotting caused by the *Entomosporium maculatum* fungus. The spots on the fruit are generally smaller than Fusicladium spots, more numerous, and not velvety. They become almost black in time, but are at first reddish. The fruit often splits deeply in consequence of the attack. This disease, however, is more troublesome on the foliage than on the fruit, and where the climatic conditions favour it, it may seriously affect a crop by causing the leaves to fall prematurely. It seems to be as widespread in the Colony as Pear Fusicladium, but it has so far passed almost unnoticed by fruit-growers. Quinces suffer as much or more than pears. Fortunately, the remedies which check Fusicladium check this disease also, and it ordinarily requires no special consideration. A few varieties of pears are specially susceptible. Winter Nelis is, perhaps, the most affected of those commonly grown in the Colony. Other varieties noticed by the writer to be much affected in eastern districts are Beurre d'Amanlis, Althorpe Crassane, Beurre Hardy, and Doyenne du Comice. In some parts of America it is not unusual for the disease to destroy the whole crop of all but a few hardy varieties. The Kieffer is said to be most exempt from attack, and the Vicar, Anjou, and Duchess also rarely suffer. The Le Conte, Beurre Clairgeau, Louis Bonne, Bosc, Clapp's, and Bartlett (Williams) are given as very subject to injury. Regarding the

last-named, however, the writer has noted seeing it holding its foliage when Winter Nelis trees were practically leafless from the disease in the same orchard.

REMEDIES FOR FUSICLADIUM.

Other conditions being equal, fruit-growers should give preference, when selecting varieties for planting, to those varieties of apples and pears which are least subject to Fusicladium; and should give consideration to this disease when they are selecting orchard sites. If his locality is considered entirely free of the disease, of apple or pear, as the case may be, the prospective grower may consider it worth his while to attempt to provide against its introduction with trees. The only measures which seem justifiable in this respect are that the trees be dipped in Bordeaux mixture after arrival at the place, that all the prunings when they are planted and all the packing materials which came with them are burned without delay, and that they be thoroughly sprayed with Bordeaux mixture as the first buds are bursting, and again a week or ten days later. No practical treatment which the nurseryman can give at the nursery would be an entire safeguard against the trees bringing infection; but in this Colony it is seldom easy to detect the presence of the disease on nursery stock, and it is probable that the spread of the disease about the country is taking place almost entirely independent of the movements of trees and fruit.

That Fusicladium may be almost entirely prevented by the timely use of proper fungicides has been demonstrated by innumerable experimental tests and widespread practical experience in Europe, America, and Australia. Freshly-made Bordeaux mixture is almost everywhere considered the best fungicide for the purpose. Little experience in combating the disease has accrued at the Cape, but a few parties have had gratifying results from spraying, and the writer is convinced that lack of thoroughness and failure or inability to spray at the most opportune time account fully for such unsatisfactory results as have come to his notice. Spots will be formed by fungus which has gained entrance into the leaf or fruit, and spots already formed will continue to enlarge, despite of spraying. And hence, unless applications are made that will prevent the fungus getting started in the foliage and fruit in the early spring, even thorough spraying may not appear worth the trouble and expense. In fighting this disease the fruit-grower has no need to worry over inaction on the part of neighbours. It has become clear that success in one orchard does not depend upon the control of the disease in surrounding orchards, and even a single effectively-treated tree will stand out in striking contrast to surrounding untreated trees in a much-infected orchard.

With regard to the prevention of Apple Fusicladium, Professor D. McAlpine wrote as follows in the general summary of a bulletin on the disease, which was published by the Victoria (Australia) Department of Agriculture in 1904:—

"The experience of orchardists and the experiments here recorded give a final answer to the question as to the efficacy of spraying, and show that 100 per cent. of marketable fruit can be secured by this means, even in a season very favourable to disease. The Bordeaux mixture alone may be used, and from the results obtained the 6-4-40 formula is to be preferred. . . . Copper soda has turned out well, and taking the proportion of absolutely clean fruit as a basis, the 6-7-50 formula is the best. The past season has shown that *the proper time to begin spraying is just when the buds are bursting and beginning to show colour,* and before the spores have had time to germinate and penetrate the young leaves and calyx. In an average summer the spores produced by the few fungus tufts occurring on a tree properly sprayed once at the right time have practically no opportunity of germinating and attacking the fruit. On the other hand, in a wet summer these few tufts continue throughout the season to furnish fresh spores for infection, and at every favourable period additional fruit and leaves are attacked, hence *two sprayings* afford better insurance against loss than one. If, however, the one spraying could be applied at the very best time and no part of the tree missed, conditions almost unattainable in ordinary practice, the one would be as good as two even in the wettest years."

The italics in the above extract were added to emphasize these portions of the recommendations. The formulæ will be explained later.

With regard to the prevention of Pear Fusicladium, Professor R. E. Smith, of California, gives the following directions in Bulletin 163 (December, 1904) of the University of California Experiment Station:—

"1. Plough under or clear up the dead leaves in the fall as much as possible.

"2. For very thorough results, spray with lime-sulphur-salt every other year as late in the winter as possible.

"3. Spray with Bordeaux mixture *twice while the buds are unfolding,* beginning the first time with formula A, when the buds are in the second stage of development . . . . (and) the second, with formula B, when 'they are in the third stage, or about a week or ten days apart. Remember that the idea is to kill the scab developing on the bark as the buds swell, and not on the young pears after they have formed. For a single treatment the early Bordeaux spray is most effective.

"4. Begin the spraying in large orchards as early as the second stage of bud development . . . . so that if delays occur the trees will get at least one spraying before it is too late. Before the first or after the fourth stage, very little direct good can be done on the present year's scab by any treatment, especially with Bartletts.

"5. Add bluestone to the Paris green-lime spray used against worms for general results, especially with the later varieties of pears."

Fig. 9—PEAR TWIGS. The First spraying for FUSICLADIUM should be applied when the buds are swollen as here shown.

The several stages of bud development, distinguished by Professor Smith, are illustrated in his bulletin, from which the figures herewith have been copied. The first stage is when the leaf buds are merely swollen. The second is when they are bursting and about the size of large beans. It is then that the trees should be first sprayed. The third is about a week later, before they are fully out —about the size of large acorns; and the fourth is when each blossom shows separately on its stem while the flowers are still closed tightly. By the time the majority of the buds reach this stage the second spraying should be completed. Formula A in the bulletin is 8-10-40, and formula B, 5-7-40. These will be explained later. Elsewhere in the bulletin, lime-sulphur-salt wash is shown to be of considerable value in checking Fusicladium when it is applied as the buds burst. Doubtless lime-sulphur would be equally effective and less apt to injure the tree. Professor Smith, however, evidently regards Bordeaux mixture as preferable against the disease, and considers that lime-sulphur-salt should be an extra treatment as regards it, and applied chiefly for the destruction of scale and Bryobia mite and for softening the bark. In Cape

orchards, where scale or Bryobia is troublesome, the use of lime-sulphur as late as it can be applied without damaging the foliage and blooms is highly commendable; and in many districts no further treatment will be necessary to guard against Fusicladium. It will be noticed that whereas Professor Smith intimates in the fourth paragraph of the directions quoted above that spraying for the disease is practically useless in California after the blossoms are formed, he, nevertheless, recommends in the next paragraph that bluestone (copper sulphate) be added to the arsenical spray used for worms (codling moth larvae).

For the Cape Colony, it may be said that two sprayings about ten days apart, the first when the buds begin to show colour and the second when the leaves begin to show separately, should be applied to all trees likely to be attacked sufficiently to justify the action. The first spraying is the more important. Then under the conditions existing in the parts of the Colony most favourable for Fusicladium, the eastern summer rainfall districts and the Cape peninsula and adjacent mainland, two or more late spring and summer supplementary sprayings will probably be found desirable in the case of pears and apples in the east and pears in the west, especially if many spots of the disease are found to have formed on the foliage and fruit. The later sprayings, in the case of pears, will give protection against Entomosporium Spot, and, in the case of apples, against Black Rot (*Sphaeropsis malorum*). The presence of the last-named disease has this season led to the confiscation and destruction, at Johannesburg, of some consignments of apples from Bathurst and Paarl. In the West, special sprayings would be unnecessary as Paris green or arsenate of lead for codling moth can be mixed with the Bordeaux mixture. Five or six applications—two before the blossoms open and the others at intervals of ten days or longer, according to the weather—are considered profitable for the protection from Fusicladium of the more susceptible varieties of apples in the eastern part of the United States and Canada if the spring has favoured the disease.

Fig. 10—Pear Twigs. The Second spraying for Fusicladium should be applied before the buds pass this stage.

Bordeaux Mixture.

Bordeaux mixture is a compound of copper sulphate (bluestone) and lime. The sulphate gives the compound its fungicidal properties, while the lime tends to prevent injury to the tree. The two ingredients need not be in definite proportions, but it is now pretty well established that the results are nearly always most satisfactory when the amount of lime is no more than sufficient to make the mixture alkaline. As lime in most countries varies considerably in its strength, and as an excess of lime has

rarely suffer. The Le Conte, Beurre Clairgeau, Louis Bonne, Bosc, Clapp's, and Bartlett (Williams) are given as very subject to injury. Regarding the last-named, however, the writer has noted seeing it holding its foliage when been considered much less harmful than a deficiency, it has been customary to recommend an amount of lime far larger than might be necessary in order to make sure that the resulting mixture is alkaline. The formula recommended in the "Remedies Sheet," issued by the Cape Department for Agriculture is:—

Copper sulphate, 98 per cent.	6 lbs.
Unslaked lime	4 to 6 lbs.
Water	50 gallons.

This might be called the 6-4 (to 6)-50 formula. The Australian and Californian formulas, given above, will now be understood. Thus the Australian one—6-4-40—means 6 lbs. of copper sulphate, 4 lbs. of lime, and 40 gallons of water. The tendency in California is seen to be to use a stronger mixture for the first spraying and a weaker one for the second, and also to use an excess of lime. A high recent authority advocates a much weaker mixture than any of these; but, withal, Cape users had best keep to the 6-4 (to 6)-50 formula. For convenience, the directions for preparing the mixture given in the "Remedies Sheet" are here re-published, with slight additions:—

"Dissolve the copper sulphate and dilute to twenty-five gallons. Slowly slake the lime and dilute with the remaining twenty-five gallons. When cool, mix part for part in a third vessel and use at once. Keep stirred. The sulphate will dissolve readily in a little hot water; and will dissolve slowly in cold water if suspended, say, in a bag of coarse cloth, near the surface The slaking of the lime had best be started with hot water, and continued by the slow addition of cold water until the mass is broken up and mixes to a smooth paste; and at no time should the lime be allowed to get dry. Four pounds of the best quality imported or Colonial unslaked lime is quite sufficient for six pounds of copper sulphate; but if ordinary Colonial unslaked lime is used six pounds had best be taken. Ordinary kiln slaked lime may be employed if it is quite fresh or has been well kept, but at least eight pounds should be taken. The lime mixture should be well strained to remove sand and coarse particles.

"Bordeaux Mixture will keep a week or more, but a freshly prepared mixture has advantages over one that has stood. Stock preparations of the two ingredients keep indefinitely, and from them the mixture may be quickly made as needed; the two may be kept in concentrated condition, but they both should be diluted before they are mixed.

"Copper sulphate and Bordeaux Mixture are injurious to iron and tin, but not copper. The dissolving of the former and the mixing are generally done in wooden barrels or tanks. A mixture not containing sufficient lime to prevent injury to foliage will soon give a coppery appearance to a polished steel knife blade held in it. A much more delicate test may be made with ferrocyanide of potassium. First thoroughly stir the mixture, and then to a sample in a clean china cup or glass add a few drops of a 20 per cent. solution of the ferrocyanide. If there is not enough lime present a reddish discolouration will be caused. A mixture containing only the minimum amount of lime required may be made by aid of this test, milk of lime being added to the dilute sulphate solution until a sample of the mixture does not stain when the test is applied. A little extra lime is generally then added, particularly if Paris green is to be used in the mixture. Iron sulphate, which is of little value in spraying, gives a deep blue colour with the ferrocyanide, and hence the adulteration of copper sulphate with it may be detected.

"Dilute copper sulphate mixed with strong milk of lime makes practically as good a mixture as when both ingredients are dilute; but a very inferior mixture results when the copper sulphate alone or both ingredients are concentrated. The ingredients should be cool when mixed.

"Arsenate of lead or Paris green may be applied in Bordeaux mixture, and arsenate of lead about two pounds and Paris green about one quarter pound to fifty gallons are good proportions for use against Fusicladium and Codling Moth together."

Copper-Soda Spray.

In Europe and Australia a good substitute for Bordeaux mixture is said to be found in copper-soda or Burgundy (Bourguignonne) mixture, which

is formed by combining copper sulphate with soda carbonate or ordinary washing soda. This is chiefly used where reliable lime is not readily obtainable. In France a water-free grade of soda carbonate is extensively sold for the purpose. In Australia washing soda is used, probably because there is not sufficient demand for the water-free grade to cause storekeepers to stock it, as is the case in South Africa. Wholesale Cape Town chemists can supply small quantities, but quote a very high price. Professor D. McAlpine gives the following directions for preparing the mixture in the bulletin quoted from above:—

"The formula recommended for general use is the 6-9-50, that is, 6 lbs. of bluestone, 9 lbs. of washing soda, and 50 gallons of water. The process of manufacture is exactly the same as in Bordeaux; the bluestone should be dissolved in one barrel and made up to 25 gallons, and the washing soda dissolved in the other and also made up to 25 gallons, and the two solutions then run evenly into a third barrel. Here there is no necessity for a strainer, as the washing soda dissolves completely. The resulting mixture is of a sky-blue colour, but more watery in appearance than Bordeaux. It possesses one advantage in that the hands are not appreciably corroded by it, but as against this scarcely any perceptible deposit is seen on the trees after the spray has dried."

The Under Secretary of Agriculture of Western Australia strongly recommends that copper-soda be used in his Colony, in his departmental *Journal* for September, 1905. He had just visited France and had seen thousands of acres of vineyards sprayed with the mixture. The formula he advised is: sulphate of copper, 4 lbs.; washing soda, 5 lbs.; and water, 22 gallons. He stated that he had used the spray against leaf-curl of the peach, shothole of apricot, and leaf-blight of potato with the best results.

Notwithstanding these strong recommendations, the writer suggests that copper-soda spray made with washing soda be used cautiously. During the past two seasons, Mr. W. R. Dewar, when Eastern Province entomologist, used some made according to McAlpine's formula and found scorching of apple foliage to result. At first impurities in the washing soda were suspected, but an analysis by the Assistant Government Analyst at Grahamstown showed that the soda employed was of excellent quality. A few months ago the Department was favoured by Mr. E. H. Tournaillon, of Cape Town, with a copy of a translation of an article on the preparation of copper-soda, written by Dr. Charles Blarey, a distinguished chemist of Bordeaux, France; and a study of this document leads the writer to suspect that the use of a greater quantity of washing soda might have prevented damage to the foliage. Dr. Blarey recommends the equivalent of about: copper sulphate (98 per cent.), 5 lbs.; *water-free* carbonate of soda (98 per cent.), 5 lbs.; and water, 50 gallons. He says that it is more economical (in France) to use the water-free (anhydrous) carbonate than crystals of soda—that is washing soda. The latter contains about 65 per cent. of water ordinarily, and Dr. Blarey recommends that three times as much of it be taken if it is used to substitute the water-free article—that is he would have the formula:

Copper sulphate, 98 per cent.	5 lbs.
Washing soda, pure	15 lbs.
Water	50 gallons.

Cape fruit-growers who wish to use copper-soda had best prepare it with the ingredients in this proportion. Large users might effect a saving in expense by having the water-free grade of the carbonate of soda specially imported. Commercially pure (98 per cent.) anhydrous carbonate of soda should be asked for. Parties situated where they can at any time get good unslaked lime at a fair price have little reason to prefer copper-soda to Bordeaux mixture, but many who are otherwise situated would find copper-

soda the more convenient. Unslaked lime soon loses its character if not kept in dry, air-tight and water-tight receptacles, while carbonate of soda will keep good indefinitely. The tests for determining if sufficient lime has been added in making Bordeaux mixture may also be used for determining if sufficient soda has been added in preparing the copper-soda compound. Litmus and phenolphtalein papers are sometimes used for the same purpose, lime or soda, as the case may be, being added until the paper shows the solution to have become alkaline. Great numbers of experienced users now weigh only the copper sulphate ingredient, and depend entirely upon one or another of the several tests to show them when enough lime or soda has been added. The lime or soda is thus economised. Moreover, it is believed by some high authorities that mixtures prepared with the minimum quantity that secures alkalinity may be used much weaker than mixtures prepared with larger quantities without decrease in the effect on fungous diseases.

Proprietary Remedies.

Several factory-made preparations of Bordeaux mixture, designed to save farmers and others trouble of preparing a fungicide at home, may be purchased of dealers in agricultural supplies. It is vastly better to use these articles than to neglect to spray; but it is generally considered that much better results are obtainable with freshly-prepared mixtures. "Bodo" mixture is a proprietary Bordeaux mixture supplied in the form of paste, in which condition the mixture is said to retain valuable physical properties lost by drying. "Strawsonite" is a much-used preparation, supplied as a powder. Both these articles are made by firms of high standing. It has been claimed that carbolic acid and some well-known sheep dips of the coal-tar type are efficient against Fusicladium. But Professor McAlpine has made decisive tests with them and found them quite useless for this purpose. Then, because arsenate of lead and Paris green are known to them to be most excellent for Codling Moth, not a few Colonial farmers have looked to them as remedies for Fusicladium, for which trouble they are practically useless.

THE AGRICULTURAL SOILS OF CAPE COLONY.

INVESTIGATION AND ANALYSES.

By C. F. JURITZ, M.A., D.Sc., F.I.C.

PART I.—INTRODUCTORY.

Van Helmont, three centuries ago, demonstrated, to his own satisfaction, that *water* was the sole source of plant food. Digby, fifty years later, ascribed the nutrition of plants to a mysterious principle in the *air*, and refused to consider water as anything more than a mere vehicle for the conveyance of this principle. Yet another half-century, and both these theories were rejected by Tull, who put forth the view that the *soil particles* constituted all the nutriment that the plant needed. He held, however, that, in order to be available as nutriment, these particles had to be extremely minute. Scarce a century has passed since Thaer promulgated the doctrine that the source of plant food was nothing other than *humus*,—a doctrine that commenced to be undermined by Saussure while still in its infancy, and was completely pulverised by Liebig when propounding his mineral theory half a century later. According to Liebig not the organic, but the inorganic, or *mineral constituents* of the soil served to build up the vegetable structure.

Fifty years have passed since the day of the great German chemist, and at present the tendency is to lay emphasis on no single one of the various views alluded to above, but to regard them all as partially true. The worth of the mineral constituents of plant food is almost universally accepted; but not to the entire rejection of organic matter as a valuable agent in determining a soil's fertility. The mechanical subdivision of the soil by sifting, sedimentation, or elutriation, is the modern counterpart of the views put forward by Tull. In the fixation of atmospheric nitrogen by bacteria we may trace a reflection of Digby's theory; and the recent investigations of Whitney and others in the United States of America have led them to conclusions which, in an embryonic state, lay hidden within the water theory of Van Helmont.

It is, nevertheless, erroneous to affirm—however much it may *seem* to be the case—that modern investigators have reverted to the opinions held by their predecessors two or three centuries earlier. It is not only in connection with agriculture that chemical science may appear to have

moved along a circular pathway, and yet the striking theories which have resulted from the investigations into the nature of radio-activity, for instance, do not by any means imply that the scientists of our day have retreated to the alchemists' notions respecting the philosopher's stone and the transmutation of metals. We may be trending back to the same vertical line of thought, so to speak, without proceeding along the same dead level: it is not a circle but a helix that marks out the path whereby science has led its students. It is of importance to recollect this, for, unless we do so, the lay mind may be misled into thinking that, because in some respects Liebig was wrong, Van Helmont was necessarily in all respects right. The direct consequence of Liebig's mineral theory was the view that the fertility, if not the productiveness, of any soil could be inferred from a complete chemical analysis of that soil. This view, it is on all hands conceded, overstates the facts, but to conclude, *from this concession*, that chemical analysis of soils, no matter how made and applied, is valueless, would be a betrayal of ignorance in regard to the general tendency of all subsequent research.

Assuming, without argument for the present, that chemical analyses of soils have *some* value, the way along which such analyses should proceed may very pertinently be discussed. But before this can even be considered it becomes necessary to enquire more closely into the method by which nutriment is conveyed to plants. Van Helmont, as has been seen, attributed this function wholly to water, a view which was vigorously contested by Liebig, who ascribed the preparation of the food of plants from the mineral constituents of the soil to the acid excretions of the roots themselves. As hinted above, there is a strong inclination in some quarters to-day to accept the substantial correctness of Van Helmont's theory, at all events in an expanded form.

A considerable recession has taken place from some of the views which found currency when first Liebig's mineral theory became widely accepted. Thus the complete chemical analysis of a soil has, for more than a score of years, ceased to be reckoned an index of fertility. Chemists of a later day, alive to the fact that the roots of plants are not able to absorb from the soil *all* the plant food constituents there present, began to modify the character of the solvents used in the laboratory for extracting this nutriment: they accordingly directed their endeavours towards extracting from the soil only such constituents, and those only in such quantities, as the plant rootlets are actually capable of withdrawing. The proportions of plant food constituents thus removed were said to be present in the soil in a form "available" to plants. Whatever the quantity of plant food there may be in any soil, unless it was present in a form *available to the plant*, it could as well, for all practical purposes, be non-existent. As soon as this view began to be held, it became necessary, if the analysis of a soil was to have any value for agriculturists, to employ weaker solvents than those at first adopted,—solvents, obviously, that would simulate the action of the plants themselves. That was the procedure which Professor Cossa urged in 1866.

Now arose the problem of finding suitable solvents: various proposals were made, and, for the purpose of putting their adaptability to the test, constant and prolonged comparisons between laboratory and field experiments were rendered necessary. A full discussion of these would be needless here; suffice it to say that the German experiment stations adopted Hydrochloric acid diluted to a certain degree, and left in contact with a specified weight of soil, for a definite period of time, at a fixed temperature. At Halle a method of determining available phosphoric oxide in soils, by extracting it with citric acid solution, was introduced, and has

since become generally recognised for that purpose, the whole scientific world over. An extension of this method was proposed by Dr. Bernard Dyer in 1894, and is now usually associated with his name. Of late years American investigators have begun to employ very small proportions of pure water, basing their practice on the view that the soil water is the only true medium for the conveyance of mineral salts to the plant.* The variable root-action of different plants rendered all the more complex the problem of discovering a solvent that would suit all cases.

Ere long one of the fundamental principles of Tull's theory was admitted to due recognition. Obviously no plant food constituents in a soil could be considered as "available" when present in compact impermeable masses: hence became clear the advisability of agreement with regard to the size of soil particles to be included in any determination. The result was a consensus of opinion that no plant food substances in any soil could be held to be avaiilable unless they were contained in soil particles not exceeding a definite maximum diameter. It therefore became customary, when analysing a soil for agricultural purposes, to pass it through a sieve of standard mesh before proceeding with the chemical analysis, disregarding for that purpose all that failed to pass through.

Scientific progress with regard to the chemistry of agricultural soils had about reached this stage when the circumstances occurred which led to the writer's undertaking the systematic investigation of the soils of the Cape Colony. How this came about may be very briefly explained.

In 1890 the writer was engaged, in connection with the Fellowship granted him by the University of the Cape of Good Hope, in the analysis of specimens of oathay from various parts of the Colony, and, in commenting upon the results of his investigations, made use of the following words:

"Another noteworthy fact, one which our farmers should bear in mind, is this, that the oathay from the Western Province contains an exceptionally small amount of lime, this being due entirely to a deficiency of lime in the soil, a deficiency which it becomes absolutely necessary to meet by the artificial application of lime manures to the soil. . . . The sample of oathay from Port Alfred contained an exceedingly small quantity of phosphoric oxide, and to this, doubtless, is due the poor appearance of the sample, its weight being about one-fourth, or less, of what it should have been under normal conditions. I have been informed that the Veterinary Surgeon holds the opinion that the cattle diseases in this district are probably due to a deficiency of phosphates in the food, and the results of these investigations appear to confirm that view; in fact, judging from the analyses of the plants only, I should say that the soil of the Colony generally appears to be rather poor in phosphates."

In the case just quoted the oats had been found to contain so little phosphoric oxide as to cause wonder that such dwarfed and sickly-looking plants had reached maturity at all, and the natural conclusion at the time was that the soil upon which the cereal crop was grown was likewise deficient in phosphates, and that, consequently, the opinion, said to have

* "It seems entirely unnecessary, in studying the question of the nutrition and yield of crops, to introduce artificial digestion media known to attack minerals very slightly soluble in water, while it seems perfectly logical to accept the nutrient solution as it exists in the soil as the basis for the support of plant life, and to investigate the question along this line. In other words, it has seemed best to consider the soil as a culture medium containing a nutrient solution—that is, to regard the soil moisture as a proper and sufficient medium for the feeding of plants, and the soil as a reservoir and distributing agent for this solution." (M. Whitney & F. K. Cameron: "The chemistry of the soil as related to crop production." 1903, p. 15).

"The delivery of water from the soil to the plant must receive more consideration in future chemical studies of soils for the reason that it is the mechanism by which the mineral nutrients are supplied to the plant, and it is evident that if the delivery be small, the plant will suffer not only for water itself, but also for the mineral food which the water supplies, even though ample quantities may be present in the soil solution, and in what would usually be regarded as readily available form." (*Ibid.*, p. 55.)

been expressed by the Government Veterinary Surgeon, was, at any rate, likely to be correct. In addressing a public meeting shortly afterwards, the writer took occasion again to refer to the subject, and then observed: "I do not regard the matter as settled satisfactorily, and commend it to the attention of the Grahamstown Agricultural School, hoping that ere long proper investigations will be made and the mystery cleared up."

About a year later the Government Analytical Laboratory was placed under my charge, and the opportunity was thus afforded me of putting the views above expressed into practice. Almost immediately some samples of soil, from the part of the Colony particularly referred to, were received for analysis, and then was confirmed the opinion previously put forward that the soil in the neighbourhood was very poor in phosphates, and that, in consequence of this, the fodder there grown would probably be found similarly deficient, and would influence animals feeding upon it in a very serious manner, inasmuch as phosphates were absolutely necessary for the formation of bone material. Further investigations were forthwith put in hand: other soils from the Albany Division, and from the neighbouring Division of Humansdorp, were subjected to analysis, and the results served to lend additional confirmation to my previous views. The use of phosphatic fertilisers for the districts named was therefore urged, and it was also suggested that farmers round about should learn to utilise bone manure as generally as possible.

The time seemed to have come for more decided action; representation was accordingly made to the Government that the primary cause of the deficiency of phosphates in the crops lay in an almost entire absence of the former from the soil, and that this deficiency, it was at least likely, if not absolutely certain, was at the root of all the "lamziekte" that those districts of the Colony were being plagued with. It was, moreover, pointed out by me how beneficial fuller information respecting the various soils of the Colony would be, and investigations, with the object of eliciting some such information were recommended to be undertaken without delay. Assurances of support on the part of the Government were readily given, and in 1893 operations were commenced. The north-eastern portion of the Cape Division was first visited, then the Malmesbury Division: after that the Caledon and Bredasdorp Divisions were taken in hand; later on those of Robertson, Swellendam, Riversdale, and Mossel Bay, and ultimately George, Knysna, Uniondale, and Oudtshoorn; while in the meanwhile, in compliance with reiterated requests, a visit was paid to some of the Eastern Province Divisions before the work was finally stopped by the war, since when it has not yet been resumed. Along its entire course, however, the systematic investigation of the soils of certain districts has been supplemented by numerous casual analyses of specimens taken, as occasion and opportunity offered, from several localities not included up to the present in the regular soil survey.

With regard to the organisation of a comprehensive scheme of soil investigation, such as that of which we felt the desirability, it is but seldom that an opportunity offers for the satisfactory carrying out of one's ideals; the limitations of funds, of qualified assistants, and of equipment in this case precluded all hope of following up the preconceived plans otherwise than in a slow and plodding way. The work was commenced by the writer entirely single-handed, but as, with the building up of a then newly-established laboratory, calls on his time increased, a great portion of it had, of necessity, to be performed by deputy; never at any time was it possible to spare more than one person for the investigation, so that all that is here recorded may be taken as representing, from first to last, including the minutest details, one man's work during the period comprehended therein.

PART II.—AGRICULTURAL CHEMICAL METHODS.

It was assumed, without argument, on a previous page, that the chemical analysis of soils had *some* value. Just what that value is, and on what conditions it depends, may to a limited extent be discussed later; but it may here be convenient to allude to the fact that there are those who would deny that it possesses any practical utility whatever. Thus Wallace* remarks:—

"No analyst, using the ordinary processes for soil analysis, can determine whether or not such infinitesimal amounts as are required by the crops are present or are not present in an available form in the soil."

Professor Whitney† again observes:—

"It appears, further, that practically all soils contain sufficient plant-food for good crop yield; that this supply will be indefinitely maintained, and that this actual yield of plants adapted to the soil depends mainly, under favourable climatic conditions, upon the cultural methods and suitable crop rotation . , ... and that a chemical analysis of a soil, even by these extremely delicate and sensitive methods, will in itself give no indication of the fertility of this soil or of the probable yield of a crop, and it seems probable that this can only be determined, if at all, by physical methods, as it lies in the domain of soil physics."

On the other hand, Professor Hilgard§ has the following:—

"Whitney (Bull. 22. U.S. Bureau of Soils) claims, on the basis of a large number of (three minute) extractions of soils made with distilled water, that these solutions are essentially of the same composition in all soils; that all soils contain enough plant-food to produce crops indefinitely, and that the differences in production are due wholly to differences in the moisture supply which he claims is, aside from climate, the only governing factor in plant growth. The tables of analytical results given in Bull. 22 fail to sustain the first contention; the second is pointedly contradicted both by practical experience and by thousands of cumulative culture experiments made by scientific observers; the third fails with the second, except, of course, in so far as an adequate supply of moisture is known to be an absolute condition both of plant growth and the utilization of plant-food. It is, moreover, well known that it is not water alone, but water impregnated more or less with humic and carbonic acids, that is the active solvent surrounding the plant root."

Granting that the chemico-agricultural analysis of soils is not an absolute but a relative method of estimating their fertility—a point that will be reverted to later—it will at once be seen that such a survey of this Colony's soils as was proposed necessitated the adoption of uniform, or, at least, of comparable methods of procedure throughout. In order, furthermore, to enable comparisons to be drawn between our results and those obtained in other parts of the world, or with those arrived at by other analysts in this country, it becomes requisite fully to describe the actual mode of procedure adopted. From the first it was realised that the investigations would extend over many years, even without the unforeseen interruptions which were subsequently caused by war and financial depression. It was practically certain also that, with the advance of scientific knowledge, there would be improvements in manipulation during the course of the survey, and it was therefore recognised as most desirable to adopt stated methods at the outset, and to adhere to them in all essentials throughout the whole series, a course without which results could not be strictly comparable amongst themselves. The great obstacle in the way of this was the fundamental differences which exist between agricultural methods of operation in this country and those practised in the northern hemisphere, where alone opportunity has hitherto offered of

* "Rural Economy and Agriculture of Australia and New Zealand," p. 169.
† "The Chemistry of the Soil as related to crop production," 1903, p. 64.
§ "Soils: Their formation, properties, composition, and relations to climate and plant growth," 1906, pp. 321, 322.

comparing laboratory results with field experiments. To do this as it really needed to be done would have involved years of preliminary work; not to do it might waste years in the employment of unsuitable analytical methods: some sort of compromise accordingly became inevitable, and a standard method was adopted and compared from time to time with one or two other methods, which will also be fully delineated in the sequel. How well the method taken as a standard has fitted in with the climatic conditions of the country is shown by the repeated agreement between laboratory results and the recorded experiences of the practical farmer. The alternative course which was open was to adopt improvements in analytical methods as they arose, and thus ensure in all respects up-to-date modes of manipulation, but coupled with an inevitable unconformity to the earlier results of the series.

In describing the methods employed the collection of soil samples claims first attention. Dr. Wiley rightly says:—"The sole object in taking a sample of soil should be to have it representative of the type of soils to which it belongs. Every precaution should be observed to have each sample measure up to that standard. The physical and chemical analyses of soils are long and tedious processes, and are entirely too costly to be applied to samples which are not representative." It will be understood that analyses of soils from cultivated fields, whatever value they may have for the owner of that particular plot, cannot, as a rule, be comprised in an investigation relating to the country at large, or even to the surrounding district; for a soil that is modified by repeated cropping and manuring, and altered by human agency, cannot be looked upon as typical or representative of any extended area. The scheme of investigation which the writer had in view aimed, for the greater part, at ascertaining the comparative agricultural values of soils over wide tracts of country, and it was accordingly sought to collect, as far as possible, only virgin soils which had not been subjected to modifying influences; in a country such as this, a most difficult and well-nigh hopeless task.

In the actual taking of the samples for ordinary agricultural chemical analysis the practice has been as follows:—The surface of the selected spot is lightly scraped with a trowel or other sharp tool, so as to clear away the top growth and surface accumulations of semi-decayed vegetable matter not forming a part of the true soil. A hole with vertical sides is then dug to a depth of twelve inches, and from the sides of this hole thin slices of soil, aggregating from five to ten pounds in weight, are removed, in as uniform a manner as possible, and placed in a suitable bag of canvas, cloth, or other impervious material through which the fine soil will not sift out on transport during conveyance to the laboratory.

On arrival in the laboratory the sample is allowed to become air-dry by being spread out in a thin layer, protected from dust, for some days. Any lumps of soil that there may be are then gently broken down by means of a wooden pestle or rolling-pin, care being specially taken to avoid crushing any mineral fragments.

Subsequent treatment of the soil thus prepared varies according as a complete mechanical or a more purely chemical analysis is desired. It had been intended to combine the former with the latter in systematically investigating the country's soils, but the exigencies of circumstances rendered such a course, though desirable, quite impracticable. In connection with the soil survey, therefore, only a restricted form of mechanical analysis was adopted, and the few instances in which the more complete mechanical differentiation was made will be dealt with separately at a later stage, where the method employed for that purpose will be outlined. At this point we shall confine ourselves to the operations more closely connected with the purely chemical analysis.

As previously remarked, the importance of finely divided particles in a soil, at first vaguely grasped by Tull, has been definitely recognised during the last quarter-century. It is now understood that, for agronomic purposes, the finer the particles which compose a soil, within limits, *cæteris paribus*, the better the soil will be for general agricultural purposes. Hence although, as above remarked, a complete mechanical analysis was not, as a rule, included in these investigations, a partial sifting out of the soil had invariably preceded the chemical analysis proper, so that any plant food material that may have been locked up within the coarser soil particles has been left out of account in reckoning up the proportion of "available" plant food present in the soil.

In preparing a soil for the chemical analysis, the "field sample" is first of all freed from pebbles by dry-sifting a sufficient quantity through a brass-bottomed sieve with circular perforations 3 mm. in diameter. All that passes through this sieve is denominated "true soil." 250 grammes of this "true soil" are placed in a porcelain dish; about half a litre of distilled water is poured on, and the dish is allowed to digest on a water bath for at least two hours, the contents being stirred at frequent intervals. When the soil has thus been sufficiently softened, it is sifted in the following manner:—A special sieve (Kahl's "Messingdrahtsieb" No. 50), having meshes of diagonal measurement ·45 to ·50 mm. and ·35 to ·39 laterally, is held over a dish containing distilled water; the moistened soil is placed in the sieve, and the latter is then immersed with the bottom about an inch or more below the water level in the dish. By the aid of a small brush the soil is now stirred until particles no longer pass through, after which the residue in the sieve is thoroughly washed with distilled water. The material which passes through the sieve is dried, together with the wash-water, on a water bath, and the weight is then recorded in percentage of the "field sample." The residue thus obtained by evaporation of the sifted soil and water is called "fine earth," and is subsequently utilised, according to the standard method of chemical analysis adopted, for the determination of lime, potash, and phosphoric oxide.

Another sufficient portion of the "field sample" is dry-sifted through a brass-bottomed sieve with circular perforations 1 mm. in diameter. That which passes through is termed "earth," and is employed in determining the amounts of moisture, organic matter, chlorine, and nitrogen.

The chemical analysis proper has now to be considered. As already indicated, the proportions of soil-constitutents mentioned in all the subsequent tables of analysis by the standard method are calculated and stated in terms as below:—

"Moisture" "Organic matter" "Chlorine" "Nitrogen"	in percentage of "earth."
"Lime" "Potash" "Phosphoric oxide"	in percentage of "fine earth."

"Fine earth" in percentage of "field sample."

Details are appended of the methods followed in determining these constituents. Two separate portions of soil are used, prepared as already described (the "earth" by sifting through a 1 mm. sieve, the "fine earth" by sifting through what is practically a ½ mm. sieve); these are, after treatment, allowed to become air-dry and bottled.

Moisture.—Ten grammes of "earth" are weighed in a tared platinum crucible, heated in an air bath from three to four hours, at a temperature from 105° C. to 110° C., allowed to cool in a desiccator, and rapidly again.

Organic and volatile matter.—The crucible containing the perfectly dry soil used in the determination of moisture is heated to redness until all organic matter has been burnt away. It is then cooled in a desiccator and weighed, the difference in weight indicating organic matter, water of combination, ammonium salts, etc. If the soil contain appreciable quantities of carbonates, the contents of the crucible, before weighing, are moistened with a few drops of a saturated solution of ammonium carbonate, dried, and heated to dull redness, after which it is placed in the desiccator to cool previous to weighing.

Chlorine.—Fifty grammes of "earth" are boiled in a marked 500 c.c. flask, with about 300 c.c. of distilled water, for half an hour. Cold distilled water is added until the level nearly reaches the mark, and after cooling it is filled up, shaken thoroughly, and filtered, by means of a Berkefeld candle filter, into a flask holding about 500 c.c., whence 50 c.c. are removed for titration with $\frac{N}{100}$ Silver nitrate, using Chlorine-free Potassium chromate as indicator.

Nitrogen.—Five grammes of "earth" are placed in a 150 c.c. oxidation flask; a globule of mercury weighing ·8 or ·9 of a gramme is dropped in, and a small fragment of solid paraffin to prevent frothing. 20 c.c. of concentrated sulphuric acid, free from nitrogen and nitrogen compounds, are then added. The flask is closed with a loosely fitting glass stopper, and heated over a Bunsen flame, gently at first, but more strongly afterwards, until colourless. When cool, the stopper is removed, and the flask is cautiously three-fourths filled with distilled water. It is then gently shaken, and the contents are washed into a 600 c.c. Erlenmeyer flask, washing the oxidation flask three times, each time with about 30 c.c. of distilled water: a small quantity of granulated zinc is added, and 75 c.c. of soda-lye, prepared by dissolving 35 grammes of potassium sulphide in 200 c.c. of water, and adding the solution to 1150 c.c. of caustic soda solution of 1·375 specific gravity. The distillation flask is closed with a rubber stopper carrying a bulb tube which is bent above the bulb at a sharp angle and terminates in a condensing tube 70 cm. long. This is connected, by means of rubber tubing, with another glass tube, dipping into 20 c.c. $\frac{N}{2}$ Sulphuric acid mixed with 50 c.c. of water in an Erlenmeyer flask as receiver. After the mixture in the distillation flask has been heated to boiling, the flame is so regulated that in 15 minutes' time the liquid in the receiver is at boiling point. The boiling is then continued for an additional five minutes. When the distillation is complete the contents of the receiver are washed over into a 250 c.c. flask, filled up, and 50 c.c. are titrated with $\frac{N}{10}$ Barium hydrate, using Rosolic acid as indicator.

Extraction of the Inorganic Plant Food Constituents from the Soil.

The chemical analysis of a soil, if the object be to gain information with respect to its agricultural qualifications, differs widely from what it would be if the aim were to settle mineralogical or geological questions. In the latter event the endeavour would naturally be to ascertain the *total* quantities of mineral constituents present in the soil, quite irrespective of their adaptability as plant nutrients; but in the former case the determination of these aggregates may be of very trifling assistance, inasmuch as it is highly probable that, of the total quantities of plant food constituents present, only small proportions may be available to plants.

The chemist, desiring to estimate the amount of available plant food in a soil, generally tries to imitate, as closely as possible, the action of the plant itself upon the soil particles. A close copy of this natural action is difficult almost to the point of impracticability, and the difficulty is not rendered any the less by the fact that certain plants have a greater facility of withdrawing the nutrient compounds from the soil than others have. It is essential to note the distinction between "plant food constituents" and "plant food." A plant food *constituent* remains such no matter where or how it may exist; it only becomes plant *food* when it is present in the soil, and then only when it is present there in the very condition in which the plant growing upon that soil can withdraw it and turn it to its own account. The expression "plant food constituent" is accordingly used throughout these pages with the specific meaning above implied, and to the term "plant food" likewise a very definite signification is assigned. Bearing this in mind, it will directly follow that a chemical analysis of the soil, in order to be of value to the farming community, should tell, not the quantities of plant food *constituents* present, but the proportion of plant *food*. It becomes obvious, then, that we are to distinguish between at least two kinds of chemical analyses of soil, one of which supplies the farmer with information of value, while the other does not; it will, however, be more convenient to look upon soil analyses as capable of sub-division into three classes or grades. First of all the plant food constituents may be present in the soil in such a condition as to be quite incapable of being absorbed by the plant; remembering that we are considering the subject from the agriculturist's standpoint, we may be justified in calling these the plant food constituents of the third or lowest grade. The chemist who wishes to include these in his determination of the *total* quantity of plant food constituents in the soil, needs to employ the strongest chemical reagents, or the energetic action of fluxes at a high temperature in order to attain his object, for the plant food constituents of the third grade are usually silicates or aluminates, and do not respond to any less radical treatment: in any case they are not plant *food*. Needless to say, that the acids generally employed by the agricultural chemist fail to extract these compounds from the soil, and hence do not give the utterly misleading results occasionally attributed to them. The first and second grades of plant food constituents differ from the third in being available for plants; that is to say, they are actually plant food. These are extractible from the soil by mineral acids, such as hydrochloric acid. The plant food constituents of the first grade are readily, or immediately, available to the plants, and the chemist can extract them from the soil by means of water or weak organic acids, such as a dilute solution of citric acid; those of the second grade are less soluble, less readily available for plants, and may be extracted in the laboratory by strong mineral acids, but not by water or weak organic acids. They are not immediately removed by the crops, but continue in the soil as a "reserve stock"—a term that we shall have occasion to use again; let it be remembered, therefore, that whenever it is employed in the course of these remarks it signifies plant food of the second grade.

Thus we have these three grades of plant food constituents in the soil:—

I. Soluble in water and in weak organic acids:
Immediately or readily available for plants.

II. Soluble in strong mineral acids:
Available for plants only as a reserve stock.

III. Insoluble in ordinary acids, and extracted only by fusion or by specially powerful reagents like hydrofluoric acid.
Not available for plants.*

Obviously the agriculturist has little, if any, interest in non-available plant food constituents, and chemical analyses—be they of a single soil sample, or of a whole series of representative soils from various parts of the country—which give only figures showing the amounts of plant food constituents present, and afford no indication as to the quantity of *available* plant food—whatever interest they may possess for the geologist—have none for the farmer. It is true that, by mechanical disintegration and chemical decomposition, plant food constituents of the third grade may ultimately become available, as they very slowly change into those of the second, but the process is so gradual as practically never to have any value for the generation in occupancy. The constituents of grades I and II, on the other hand, possess great interest for the farmer; they comprise the actual plant food: the former affect the land's immediate productiveness, the latter its permanent value. In an investigation such as that under review, then, we may dismiss grade III from further consideration. The first grade, or immediately available plant food, is of less account than in a country where agricultural lands are usually held upon short tenancy; and, in any case, where the object is to gain information respecting the agricultural potentialities of extended areas, insufficient data would be afforded by determinations of the readily available plant food in the soil: individual farmers may profit by such investigations, but even then, to be of lasting value, they would have to be constantly repeated, and upon very much more comprehensive lines than the utmost range of practicability, if they are to meet all needs.

So we are brought to this conclusion, that, if a chemical investigation of a country's soils is to be made, it is the reserve stock of plant food in the soil (that is to say, the constituents of the second grade) that calls for first attention. They are continually changing into plant food of the first grade, and are being removed from the soil by plants very much more rapidly than they can be produced from the third grade constituents. It may be of some value, either incidentally, in certain cases, or subsequently to a thorough investigation of the reserve stock of plant food in the soils of the whole country, to inquire into the conditions and quantities of the other two grades as well, but the immediate and pressing necessity is to proceed with all speed along the line just indicated as demanding prime attention.

Different plants have, as already remarked, different absorbing powers, and hence we may almost say that the immediately available plant food in a soil varies in amount with the crop to be cultivated. If, therefore, we ascertain the maximum amount of plant food that can become available to *any* plant from a given soil we shall gauge the utmost limits of that soil's natural fertility, as far as it is affected by chemical considerations. If that be his purpose, the chemist should employ as a solvent not one which will

* The following figures, adapted from Bulletin No. 41 of the Minnesota Agricultural Experiment Station, illustrate the fact that soils contain considerable amounts of plant-food constituents which are not available for plants :—

	Wheat Soil. Grade II.	Wheat Soil. Grade III.	Heavy Clay Soil. Grade II.	Heavy Clay Soil. Grade III.	Grass and Grain Soil. Grade II.	Grass and Grain Soil. Grade III.
Lime	2·44	·36	·48	·16	·51	·35
Potash	·54	2·18	·21	3·46	·30	1·45
Phosphoric Oxide	·38	—	·12	·08	·23	·05

In the case of the clay soil, it will be noticed, as much as 96% of the potash was in a form unavailable for plants.

simulate a single crop of weak extractive power, that is to say, a solvent that will take out little more than the constituents of grade I, leaving the bulk of those of grade II untouched. Of course, he is well aware that the soil which contains a large stock of plant food of the first class will in any case be chemically rich; it will therefore be fertile, provided that other factors—the physical character of the soil, the supply of water, and so on—are not defective. But he knows equally well that if the maximum of available constituents fall below a certain limit, the soil must of necessity be poor, whatever other conditions may be favourable. Hence the first object of a systematic soil survey along chemical lines should be to ascertain the maximum proportions of plant food likely to be available to average crops within a reasonable period of time in the area under examination. For this reason, especially in a country like this, consisting of immense tracts of virgin soil, amongst which there are many poor soils, the writer considers that a great deal more information will be gained by the extraction of soils by means of Hydrochloric acid than by applying Dyer's citric acid solution. The latter may be employed subsequently, as supplementary, but the former method should certainly take precedence.

Professor Hilgard makes some incisive observations with regard to the threefold differentiation of plant food constituents in soils, which bear directly on what we have said above. In order to appreciate his remarks in this connection, some extracts, leading up to them, from his work already quoted are essential. He says:—*

"While the obvious importance of the physical soil-conditions has long ago rendered them subjects of close study by Schübler, Boussingault, and others, the chemistry of soils was very generally neglected for a considerable period, after the hopes at first entertained by Liebig that chemical analysis would furnish a direct indication and measure of soil fertility had been sorely disappointed in respect to the only soils then investigated, viz. the long-cultivated ones of Europe. The results of chemical analysis sometimes agreed, but as often pointedly disagreed, with cultural experiences; so that after the middle of the nineteenth century but few thought it worth while to occupy their time in chemical soil analysis. . . . . . Among the few who, during the middle of the past century, maintained their belief in the possibility of practically useful results from direct soil investigation were Drs. David Dale Owen and Robert Peter, who prosecuted such work extensively in connection with the geological and agricultural surveys of Kentucky and Arkansas; and the writer, who carried out similar work in the States of Mississippi and Louisiana, with results in many respects so definite that he has ever since regarded this as a most fruitful study, and has later continued it in California and the Pacific North-west. This was done in the face of almost uniform discouragement from agricultural chemists until within the last two decades, with occasional severe criticisms of this work as a waste of labour and of public funds. All this opposition was largely due to the prejudices engendered by the futile attempts to deduce practically useful results from the chemical analysis of *soils long cultivated*, without first studying the less complex phenomena of *virgin* soils; and these prejudices persisted longest in the United States, even though in Europe the reaction against the hasty rejection of chemical soil work had begun some time before, as is evidenced by the methods employed at the Rothamsted Experimental Farm in England, the Agricultural College of France, the Russian agronomic surveys, and at several points in Germany. . . . . . In the United States as well, the ancient prejudices have now gradually given way before the urgent call for more definite information than could otherwise possibly be given to farmers by the experiment stations, most of whose cultural experiments, made without any definite knowledge of the nature of the soil under trial, were found to be of little value outside of their own experimental fields. . . . . . In many existing treatises so much emphasis is given to the alleged proofs of the inutility of chemical soil examination in particular, that a special controversion of these arguments seems necessary. . . . . . *In all these discussions the difference between* the ascertainment of the *permanent productive value of soils*, as against that of their *immediate producing capacity*, must be strictly kept in view. The former interests vitally the permanent settler or farmer; the latter concerns the immediate outlook for crop-production, the 'Düngerzustand' of the Germans. The methods for the ascertainment of these two factors are wholly distinct, even though the results and their causes are in most cases intimately correlated. The failure to observe this distinction accounts for a great deal of the obloquy and reproach that has in the past so often been

* Hilgard: *Op. Cit.*, pp. 313, 316–320.

heaped upon chemical soil-analysis and its advocates. . . . . . The abundant *presence* of the plant-food ingredients, as shown by analysis, will not avail, unless at least an adequate portion of the same exists in a form or forms accessible to plants. Of course this condition would seem to be best fulfilled by the ingredients in question being in the *water-soluble* condition. But . . . substances in that form would be very liable to be washed or leached out of the soil by heavy rains or irrigation. . . . . . It is therefore clearly desirable that only a relatively small proportion of the useful soil-ingredients should be in the water-soluble or physically-absorbed condition, but that a larger supply should be present in forms not so easily soluble, yet accessible to the solvent action which the acids of the soil and the roots of plants are capable of exercising. This *virtually* available supply we may designate as the *reserve food-store*."

Hilgard's remarks* have been quoted thus lengthily because his book on the subject has all the qualities of a standard work of reference, embodying, as the work of no other writer in recent years has done, in the clearest language, the most reasonable present-day theories on the subject dealt with. Following out his line of reasoning, it will be seen at once that, in a series of investigations of the nature, and carried on under the circumstances of those that have been performed in the Government Analytical Laboratories here, quantitative determinations of the ingredients of grade III possess little more than academic interest, while the readily-available or water-soluble constituents of grade I do not urgently need investigation so long as vast fields of exploration have to be entered upon in respect of the reserve stock, or, as Hilgard terms it, the reserve food store, in the various soils of the Colony. It is this programme that we have mitted, during the earlier portion of the past dozen years.

In the investigations conducted in the Government Analytical Laboratories one method of soil extraction has been adopted as a standard, but it has been supplemented by sundry others for comparison. In deciding upon a standard method, a solvent had to be chosen—bearing in mind what has already been said—that would represent, not the slight action of a single crop, nor a dissolving capacity far in excess of any action that successive crops could exert during many years to come. The aim was rather to make use of a solvent that would extract from the soil just as much of the materials composing the food of plants, as lies ready to hand for conversion into constituents of the first grade as fast as the latter are withdrawn by cultivation. Obviously an adoption of such a *via media* necessitates the rejection, on the one hand, of comparatively weak solvents, such as pure water, which would extract only the directly or readily available plant food, and, on the other, such powerful reagents as boiling *aqua regia* or sulphuric acid, which would, in addition, dissolve out substances totally unavailable as plant food.

Investigations have, it is true, been made in our laboratory with dilute citric acid, but simply to compare its action as a solvent with the standard method.

We have yet to face the question of the actual solvent to be employed in extracting the soil; having decided what *not* to use; *e.g.*, any that would stop short with the extraction of readily available constituents, on the one hand, or that would include in their action constituents that are not available at all, it still remains to fix on what may be termed a reserve stock solvent; and here again discrimination is necessary. "Of all the mineral acids available," says Dr. Wiley,* "no one possesses solvent powers for soils in a higher degree than hydrochloric." That acid has accordingly long been used by analysts for the purpose, and it was also resorted to in these investigations for a similar reason. In this connection, however, three points awaited settlement, namely, the strength of hydrochloric acid to be employed, the length of time the acid should remain in contact with the

* See also Snyder: "The Chemistry of Soils and Fertilisers," pp. 69, 70.
* Principles and Practice of Agricultural Analysis," Vol. I., p. 345.

soil, and the temperature at which it should be allowed to act. Loughridge found† that hydrochloric acid of 1·115 sp. gr. exerted a greater dissolving effect upon the soil than either a stronger or a weaker acid; this strength of acid had also been adopted in our investigations. He also found that the solvent action continued to increase for five days and then ceased. Upon the above basis the standard method generally employed in the Government laboratories has been formulated; it is the first of the methods outlined below. One respect in which this method differs from that of Hilgard and Loughridge is in respect of temperature. In the warm sunny climate of this Colony it would appear that root action is more energetic than in colder lands. It has been found, for instance, that proportions of phosphoric oxide which would be considered inadequate in Europe, in this country often suffice to yield satisfactory returns. But this greater root action results in a more rapid depletion of the reserve stock of plant food in the soil: that reserve stock, therefore, is rendered relatively smaller than under circumstances of lesser root activity. To represent this fact in the laboratory when a soil is to be analysed, it accordingly becomes necessary to employ a weaker solvent so as to indicate a relatively lower maximum limit of plant food in reserve; no direct experiments to test the validity of this theory have been made, but the substitution of the ordinary temperature for that of the steam bath in the hydrochloric acid extraction method seems to fit in exactly with the conditions of this Colony, and the results thereby obtained tally closely with the practical experiences of farmers.

It must again be observed that although every soil which may yield large quantities of soluble plant food to this method of extraction is not thereby proved to be fertile, yet, as the method represents a maximum, we may definitely consider all soils that show *small* proportions of soluble constituents under its treatment, to be unmistakeably poor, and in need of replenishment. To a certain extent, also, we may assume the fertility of a soil which yields good results not only by that method, but also when treated according to the citric acid method of extraction outlined below.

Two other extraction methods by Hydrochloric acid have been used in several of the analyses; they are the second and third of the methods described below, the former being that of the German Experiment Stations, and the latter one stated to have been devised by Professor Maercker, of the Halle Experiment Station.

(To be continued.)

† American Journal of Science," Vol. VII, p. 20.

SOUTH AFRICAN BEE-KEEPING.

By H. L. Attridge, F. R. Met. Soc.

[Lecturer at the late Agricultural Schools at Stellenbosch and Somerset East and Apicultural Adviser to the Department of Agriculture.]

(Continued from Page 704).

CHAPTER IX.

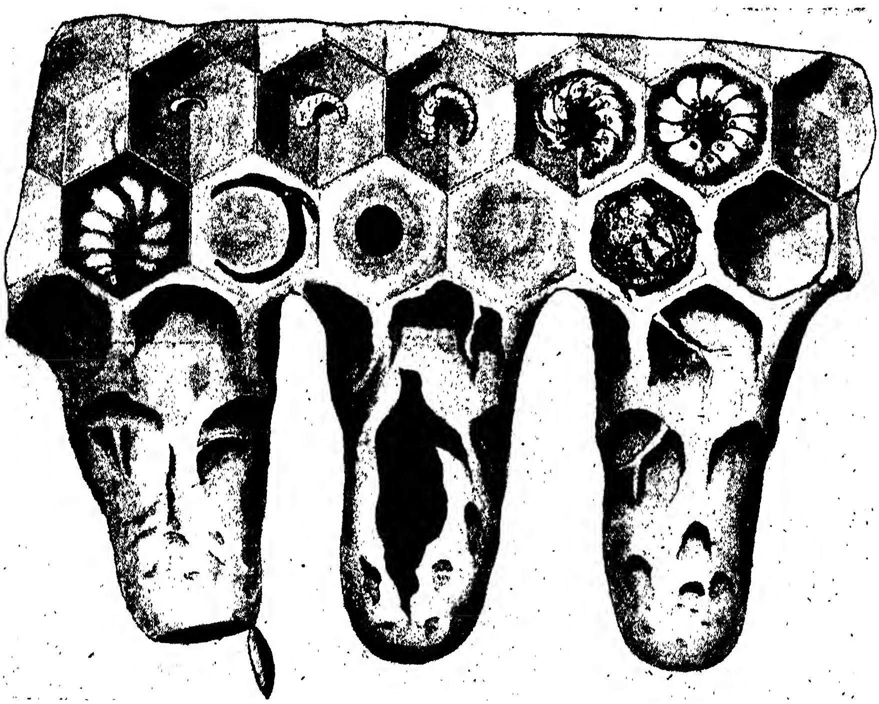
The Food of Bees in the Larval State and their Metamorphoses.

The eggs laid by a fertile queen will be seen in the accompanying drawing as minute white spots slightly elongated in shape, and attached by one end to the base of the cells. A young queen may be a little erratic in performing her duties at the beginning, and an occasional cell may contain two or three eggs; but this need not be mistaken for the work of a fertile worker. After a few days, having settled down to the business, she deposits cell by cell, one egg in each, with beautiful regularity and seldom missing a cell. The eggs contain the usual constituents, yolk, and albumen, and hatch into tiny white larvae on the third day. Just previous to hatching, the egg is surrounded with a milky-looking fluid, which forms the first food for the young larva. The food for the first three days of larval existence consists of pre-digested material called chyle, this is prepared by the nurse bees, and forced into the cells by a prolongation of the chyle stomach through the honey sac. On the fourth day some important changes take place in the dietary, which has been the subject of much discussion and investigation by such scientists as Schönfield, Dr. De Planta, Cowan, Cheshire and others, who have amply demonstrated that this change of diet has a wonderful significance and marked influence on the further development of the larvae. We must now follow this a little in detail, as it has an important bearing on our subject. We have observed in a previous chapter that the fertilized queen can lay two kinds of eggs; that is to say they will hatch into worker or drone larvae.

The question now naturally arises, How are young queens raised? We can answer this at once by saying that young queens are produced from worker eggs or very young worker larvae only. We shall now see

how this is accomplished, by tracing the development of Queen, Worker, and Drone, in their several order.

We have just observed that the change of diet takes place from the fourth day, this applies to worker and drone only. If it is the intention of the worker bees that one or more of the eggs or young larvae should develop into queens the same rich nutritious food is continued throughout the larval state; in fact some authorities think that this food is provided for absorption during the first part of the chrysalis stage, the larvae are most lavishly fed and "royal jelly" may be occasionally seen in the cell after the young queen has vacated it. The queen is reared in a much larger and differently shaped cell to that of the worker or drone, which allows not only for considerable food being placed in the cell but provides for other important developments during the transformation of the inmate. After feeding the queen larva for about 5 days, the cell is sealed over and a further 4 days is occupied in spinning the cocoon, period of rest, and transformation into nymph; another 3 days is allotted to this process, making 15 days in all, from the time the egg was laid; when the young queen emerges from the cell.



Brood Comb and Queen Cells.

In the case of the worker larva, this is weaned on the fourth day, and from this time, in addition to the semi-digested food, a large proportion of honey is added to the diet. The sealing of the worker cell takes place about the same time as that of the queen cell, the remaining stages taking about 13 days, making in all 21 days for the final perfecting and issue of the insect.

Corner of an English Bee Yard.

His First Lesson.

The drones development is still slower, the feeding stage occupying about 6 days, a day longer than for queen and worker; during this period in addition to the honey and semi-digested pollen en honey food supplied to the worker, the drone receives a large quantity of undigested pollen. Each stage is slower, the time of spinning the cocoon, rest and passage through nymph state taking about 15 days, making in all about 24 to 25 days from the time the egg was deposited.

CHAPTER X.

Bee-Products.

Honey.—It is supposed by many that honey is secreted by flowers gathered by the bees and transferred to the hive in that form. Strictly speaking this is incorrect; it is nectar that flowers secrete, and not until it has undergone a digestive process and conversion into grape sugar in the bee's stomach, does it become honey in its true characteristic form.

Comb. Wax Cells.

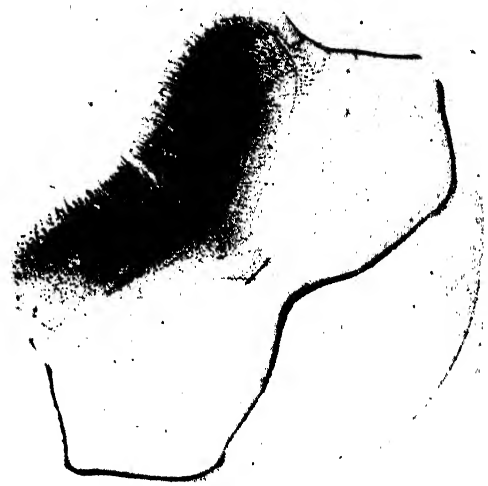
The nectar is gathered from flowers by lapping and suction, and conveyed to the honey sac. Here a chemical change is effected, which transforms the nectar into honey, it is then disgorged by the workers into the combs prepared for its reception where it remains until the surplus water has evaporated and the right degree of ripeness obtained. It is then sealed over, as will be explained later on. Ripe honey will not contain more than about 15 to 28 per cent. of water. Honey should not be removed from the hive until properly ripened by the ascending heat. Artificial means have been tried for ripening honey, but not without a bad effect, the honey losing much of its characteristic aroma and flavour. The chemical changes taking place in converting nectar into honey are somewhat elaborate, suffice to say that pure honey cannot be imitated. These changes eminently fitting it for ready assimilation by the digestive system.

If honey, both as a food and for its medicinal value, was better known, the consumption of this important product would be increased enormously, containing as it does all the virtues and important elements of the particular flowers from which the nectar was gathered.

As a food for children and for adults with impaired digestion, there can be no equal. It can be used in all kinds of cookery, many things being greatly improved by its peculiar qualities. Cakes made with honey, instead of sugar, will keep moist for months, which is worthy of notice in a dry climate. Summer beverages can also be sweetened with honey. In cases of rheumatism, asthma, hoarseness, cold, cough, bronchitis and all affections of the throat and chest, honey is extremely useful and beneficial. In treatment of consumption honey has been prescribed instead of cod liver oil with good effect.

After removal from the hive, honey will generally granulate when exposed to a temperature below 70° Fahr. Granulation does not impair

the quality of honey, which can at any time be brought back to the liquid form by standing the bottle in hot water for a short time. Some kinds of honey granulate quicker than others.



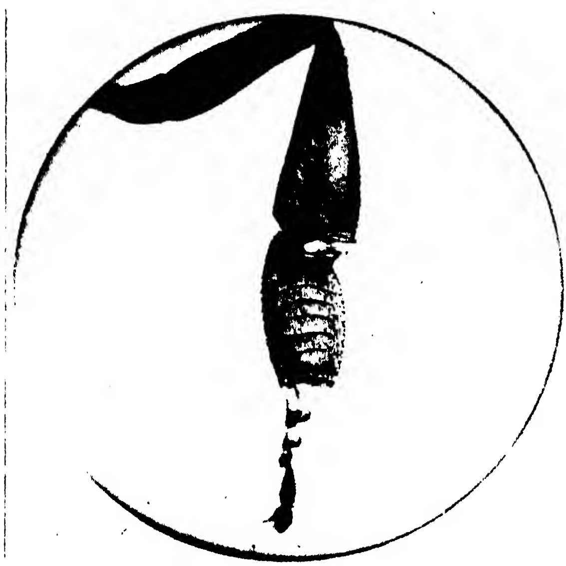
Ventral Plates or Wax Pockets.

Wax.—Next to honey in importance is wax. This material is not collected outside the hive as generally stated, but is produced by a secretion in the bodies of the worker bees; to put it simply we might say that beeswax is superfluous fat, the production of which can be regulated by the workers. On the underside of the abdomen between the segments are

Jaws of the Bee.

what are known as wax-pockets, from which an oily secretion exudes, forming on solidifying tiny white plates or scales of wax which are worked up by aid of the mandibles and anterior legs into ribbons for comb-building. To produce wax two essentials are necessary—warmth and an abundance of food. These are obtained

by taking absolute repose in close clustering and partaking of a quantity of honey and pollen. Many diverse views are held as to the quantity of honey consumed in making wax, no doubt owing to the difficulty of conducting the various experiments under identically the same conditions. Under certain conditions, probably not more than 6 to 8 lbs. of honey will be required, while at other times 20 lbs. will be required to produce a pound of wax. If we take the mean, say 13 to 14 lbs. of honey, we see that comb building, apart from loss of time, is an expensive item. This great cost can now be obviated or materially reduced by the use of comb foundation which will be explained shortly. Wax is used not only for comb building but for sealing over the ripened honey and also when mixed with pollen is used for capping the brood cells. Some races of bees use wax instead of propolis for closing up cracks and crevices about the hives. The colour of wax varies consequent upon the kind of honey fed upon by the bees during its production. It is remarkable that a dark honey produces wax lighter in colour than that produced by feeding on light honey,



Pollen Basket.

due probably to the colouring matter in the pollen. Bees will build comb quite readily if provided with properly prepared syrup made from cane sugar.

Pollen or Bee-bread.—This is the farina or fertilizing dust of flowers When chemically examined it is found to contain most of the important food elements; it is rich in albuminoids and also contains sugar, starch and oils.

Pollen is used extensively in the hive for the preparation of larval food, also used with wax for sealing brood combs and largely partaken of by the adult bees. The workers are careful to keep a supply of this material on hand, but if through any unforseen circumstance the supply fails they will accept a substitute such as pea flour or wheat flour, although it is very seldom in this country that natural pollen is unobtainable. Pollen is collected from the stamens of flowers by the workers, the

tongue, jaws and legs being brought into requisition for this purpose. As collected, it is moistened by the tongue and passed on to the pollen baskets, situated on the posterior legs. The pollen baskets are surrounded with stiff hairs to support the maximum load that can be carried. The pollen can be seen as little oval pellets of various colours, depending upon the source of supply. It is noticeable that bees only carry pollen of one colour at a time. On reaching the hive the pollen is deposited in cells near the brood nest. If to be kept for future use it is covered with a layer of honey.

Propolis.—This is a resinous substance obtained from buds of flowers, fir trees, disused hives, varnished surfaces, etc. It is a very useful material for covering up all irregularities in badly made hives, but is a great source of annoyance to the bee-keeper owing to its adhesiveness to hands and clothing. South African bees are prone to use a quantity of propolis in closing up cracks to keep out ants and other numerous enemies. If a mouse, snail, or other object obtain access to the hive and die there, and is too large for the bees to remove, they encase it with propolis, and thus hermetically sealed it remains free from putrefaction.

Worker Combs.—These are built entirely of wax, the cells being hexagonal in shape with pyramidal bases. The form of cell has been the subject of much controversy and investigation, engaging the minds of mathematicians from all time. The cells are formed on the most economical lines known, combining the greatest strength and largest capacity with the minimum of material. The average worker cell is about 1-5th inch in diameter and a trifle less than ½ inch in depth, accommodating approximately about 25 young workers to one square inch of surface. The cells are not quite horizontal, but have a slight fall towards the base or midrib of the comb; this is not so perceptible with brood combs as those prepared for the storage of honey. The measurement from the centre of one comb to the centre of the adjoining one is usually 1 9-20th inch, say 1½ inch. Bees do not appear to observe any particular direction when building comb as referred to the hive entrance or compass bearing when left to their own devices. They sometimes, perhaps most frequently, build their combs parallel to the entrance, at other times at right angles, and very often take a diagonal direction.

Drone Comb.—This is built of the same material and shape, as the worker cells, only the dimensions are greater. About four cells go to the lineal inch, making approximately 16 cells to 1 square inch of surface. Drone brood may be distinguished by the prominent convex, almost hemispherical capping; this shape allows for a little extra depth of cell to accommodate the larger bee. A mixture of pollen and wax is used for capping both worker and drone brood combs.

Honey Comb.—Either worker or drone comb is used for storing honey. During a glut, if not provided with worker size foundation bees usually build drone comb for storage purposes, increasing the pitch of cell towards the midrib very considerably and lengthening the cells much beyond the normal length of brood cells, where space will allow. Bees prefer to store their honey away from the entrance and above the brood nest. By this means the heated air in its ascent assists evaporation and the ripening process. When ripe the honey is sealed over with pure wax, the method adopted and appearance of the capping when finished varies with different varieties of bees. The black bees (European) and Carniolans leave a little space between the surface of the honey and the underside of capping which, being fairly thick, gives a beautiful white appearance to the comb. Most of the yellow class of bees, including South Africans, fill the cells right up to the capping, which being left thin and semi-transparent, the general result is not so satisfactory; especially is

this the case with dark honey. Although the honey comb is extremely delicate, the base of the cells, being only about 1-80th of an inch thick and the side walls even thinner, a few ounces of wax will support several pounds of honey.

Queen Cells.—Queen cells are usually constructed on the edges of brood combs, hanging with the opening downwards. When completed they resemble an acorn or pea-nut in shape, and are covered with indentations to increase their strength. They are formed with a mixture of wax and pollen, and being rather an expensive article the workers utilise the old material removed in clearing the site and work up any superfluous portion from surrounding cells.

CHAPTER XI.

Hives and Appliances.

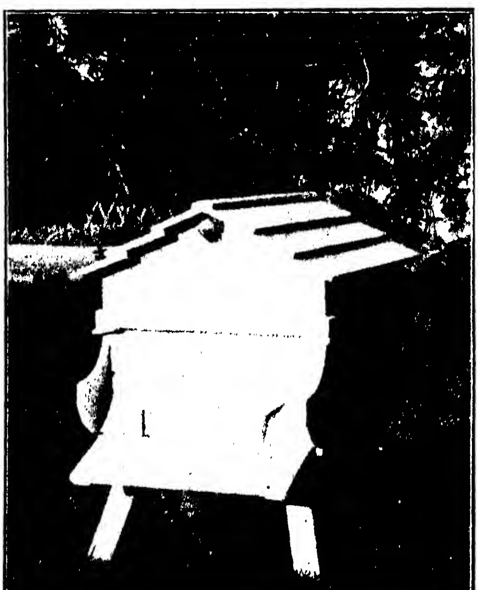
Before proceeding with that part of our subject having special reference to bee-keeping in practice, it will be well that the uninitiated reader be made acquainted with descriptions of some of the most necessary and useful articles used by the modern bee-keeper.

Corner in O.R.C. Apiary at Grootvlei Experimental Farm near Bloemfontein.

Hives.—A movable comb or Bar Frame Hive is a bee-domicile in which bees live under more comfortable circumstances, increase with greater rapidity when required, and store the honey under more favourable conditions than when left to their own devices in their own selected habitat. The owner has entire control of their movements, and when properly managed compatible with the natural instinct of the occupants, a larger yield of honey is obtained than by any other method.

Owing to the physical configuration of South Africa, rising plateau above plateau from the coast to the interior, we have considerable variations in climate. Rainfall, temperature, humidity, etc., being largely controlled by the difference of altitude, it is necessary to carefully consider the effect of such conditions on bee-life before adopting any particular type of hive. At the same time it is very desirable that we should have uniformity as far as possible throughout South Africa. Without at

present referring to any particular make of hive we would give a few broad rules for guidance. In selecting a hive, always remember that properly constructed hives combined with good management are two primary essentials to successful bee-keeping. The latter may be acquired by practice and careful observation, but an unsuitable hive will always be a source of trouble and annoyance, probably ending in disaster and the eventual abandonment of the "box of frames" and its contents to an obscure part of the premises, the bees being left for ever to their own devices and the disappointed owner found amongst those who "never could do much with such new-fangled arrangements." Many of the imported articles and their bad imitations here also have signally failed in their purpose in several instances. Although adapted to the requirements of the country where they were manufactured, when brought into use in South Africa, with a different climate and other conditions and requirements, are found very often to become practically valueless, and impediments to progressive bee-culture.



Author's Double Wall Hive with Author's Improvements for Winter Use.

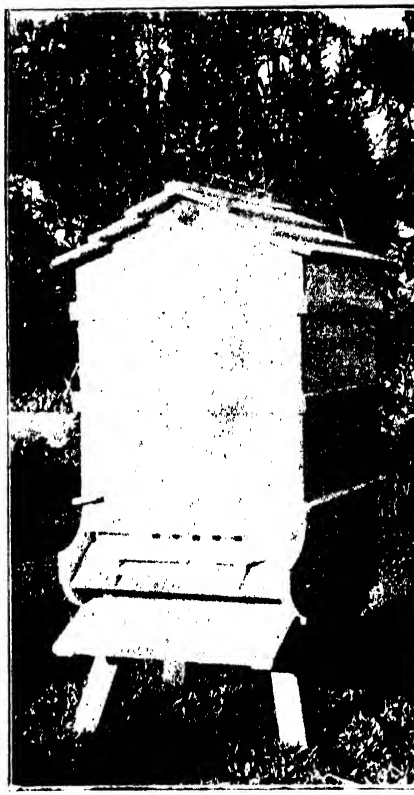
With suitably designed and properly constructed bar frame hives, the bee-keeper can do very much as he may dispose with his bees and the exact condition of the community at almost any time be ascertained. The frames of one hive being interchangeable with those of another, he can strengthen a weak stock with frames of hatching brood taken from a stronger one. Should the queen show any undesirable traits as evidenced by the behaviour of the workers, or should she become old and her progeny suffer in consequence, she can be removed and a young one introduced.

Natural swarming can be controlled to a very great extent; artificial swarms made; the production of useless drones prevented; colonies united; and breeding stimulated at proper times. The bee-keeper can

also obtain the surplus honey—the specific end in view—in a clean, wholesome form, free from brood and bee-bread in sections or frames selected for the purpose.

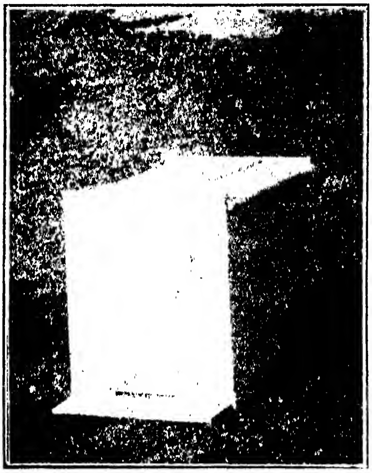
These are a few of the numerous advantages obtained by using a bar frame hive.

In reverting to what was said above with regard to uniformity in hives, the hive most suitable for general adoption and best able to meet the requirements of every possible condition in this country is what is known as the double-walled type, with spacious roof admitting of free ventilation and air space above the frames or sections. Without going very minutely into the virtues of double-walled versus single wall hives, it is very clear that as we render bees less susceptible to variations of temperature, so in proportion will it make for their general welfare; therefore by observing the laws regulating the adjustment of temperature, we select a double-walled hive as being warmer, and more satisfactory for winter use than one of the single wall type; it is also the more economical of the two, the bees requiring less stores or feeding in a double-walled hive. Equally for summer use its superiority over a single wall hive with close fitting roof is obvious, the enclosed intervening space between the side walls and roof affording protection from the direct rays of the sun, which is not obtainable with single wall hives unless artificially shaded. In theory this must be apparent to any person of ordinary intelligence; in practice it has been conclusively proved to be so. Single wall hives, however, are very suitable for use in bee-houses or covered apiaries, where they will receive protection from the elements, or are good enough for, say, the coast districts of Natal where shade can be obtained in summer. But for general South African purposes, after extended trial and personal observation of bee-life in many parts of South Africa, we have no hesitation in saying that a double-walled hive on, say, at least three sides with a respectable porch on the other, with roof allowing of air space and ventilation above frames, will be found the most satisfactory under all circumstances. We might add that of several suspected bee-diseases submitted to us for diagnosis they have, we believe, without exception, been found in single-wall hives with roofs fitting hard down, and no ventilation. Overheated brood and chilled brood being common in this class of hive. In summer



Author's Double Wall Hive with Improvements and Non-Swarming Arrangement for Summer Use.

they throw off innumerable swarms, and when wintering, owing to the consumption of stores in sustaining the internal temperature, the bees are frequently driven to the point of starvation and forsake the hive in one desperate attempt to procure food, or unite themselves with another colony better provided for. Those who have adopted single wall hives for want of a better knowledge of the subject may convert them into the type indicated with very little trouble, and in future obtain their supplies on the double-walled principle.



Single Wall Hive.

Frames.—The main feature of a bar frame hive is that each comb is built in a separate frame, which can be removed from the hive with trifling disturbance to the bees and without injury to the comb. Frames are made rectangular in shape with the ends of top bars projecting beyond the sides, on these ends or lugs are fixed distance spacers to regulate the position of frames relative to each other and the side walls and floor of hive. The frames are suspended by the ends which is the only part of the frame in contact with the hive. The outside measurements of all frames and the inside dimensions of the hive must be uniform. By nature, bees work on definite lines and maintain certain measurements for passages and spaces between and round about the combs, just sufficient to allow the population to move about with comfort, and no more. It is imperative that these rules be observed when designing the frames and interior fittings. If the spaces left are too wide, the bees will fill them with burr-combs and braces, and if too narrow, will be closed with propolis, thus nullifying the whole system and practically rendering the frames *immovable*. We have experimented largely with frames of different sizes, and have no hesitation in saying that for general use and easy manipulation the frame known as the British Standard frame is the most suitable and convenient. This frame has now been adopted by the Transvaal Bee-keepers Association, the O.R. Colony, and recommended by the Hon. Sec. of the Cape Colony Bee-keepers' Association of Port Elizabeth. It is used by several advanced bee-keepers, and we hope to see it adopted at an early date as the standard frame for this country.

(To be continued.)

REPORT ON GRAFTED AMERICAN RESISTANT VINES.

ROBERTSON DISTRICT.

By I. Tribolet, Viticulturist, Elsenberg Agricultural College.

The introductory remarks made in the Tulbagh and Worcester reports on this subject, as to the varying character of the soil, etc., also apply to the Robertson District in a marked degree, so that it will be unnecessary to repeat them here.

The first farm visited was that of Messrs. J. and G. Bruwer, at De Hoop.

This nursery, in fairly good but rather damp river bed soil, was inspected and Muscadel, supposed to be grafted on Riparia, are doing indifferently, most of the stocks growing out were found to be Rupestris of the "Apricot leaf" variety.

Part of the nursery consisted of Sultana on Aramon not doing well either, and showing a great number of misses. The ones growing formed rather an unsightly knob at the junction of the stock and scion. The failures might partly be attributed to faulty grafting and partly to the wetness of the soil. A patch of White French on Metallica doing fairly well. Small plot of Americans and Hybrids 10 varieties, all mixed, put in last season, none of them making much headway. Young vineyard of Muscadel on "Apricot leaf Rupestris," planted the season before last on hillside, growing, but not vigorously. This land had formerly been under "Kalbas" and had not received much preparation before planting the young vines.

At Mr. Bruwer's, sen., in the same valley, a nursery of Muscadel on Metallica, planted in the river bed, had been submerged and partly washed away by the recent floods; the few left promise to make good vines. As in other parts of this district it is very difficult to judge which stock is doing best, as on investigation it is often found that a supposed plot of Metallica or other variety consists of a mixture of a number of different sorts.

Phylloxera has a very firm grip on the vineyards of De Hoop, and as a natural consequence a good many of them have not received, in the matter of cultivation, the attention that they have been getting hitherto.

In the lower part of the village of Robertson, on a rather stiff clay with a pebbly sub-soil, Mr. Pieter de Wet has Muscadel on Metallica of one and two seasons' growth doing very well.

Mr. C. Marais' farm "Wonderfontein" was next visited. On a fairly stiff clay soil Jacquez as a self-bearer is doing well and carrying a good crop. In patches of brak soil it has died out as has also Metallica planted on brak patches, whilst on other portions where it is not brak, Muscadel on Metallica is carrying a good crop. In one particular brak spot on which several American varieties have been tried all succumbed with the

exception of one stick (Aramon X Rupestris No. 12). From this stick Mr. Marais is going to establish a small plantation and try it on all the brak spots in his vineyard.

Next we come to a patch of Hermitage on Metallica doing well, a plot of Red Hanepoot on Jacquez purchased from private individual. These vines when planted seemed to be suffering from some kind of root rot fully 20 per cent. died out; those still alive seem to be recovering and have made fair growth this season. Same variety on same stock obtained from Government nursery doing well. A number of Hanepoot grafted last season *in situ*, on 3306, 3309 and 1202 all doing well so far.

White Hanepoot on Jacquez, planted in ground immediately after old phylloxerated vines had been taken out, have made good growth and look remarkably healthy. Hermitage on Aramon in a moist, deep soil are good.

The same may be said of Sultana on Metallica. Raisin Blanc on Metallica 2 years old looking very well, except that it has a big knob at the union somewhat similar to that noticed at Paarl last season where this vine was grafted on Aramon. The recent floods did considerable damage to Mr. Marais' vineyard, and it is to be regretted that an experimental nursery of some thousand vines was completely destroyed. I might here note that Mr. Marais is anxious to have an experimental plot on his property, under Government supervision, for testing different American resistant stocks. I should say that his farm would be ideal for that purpose, as it is made up of a great variety of soils.

Mr. G. O. Cilliers' farm "The Glen," at "Klaasvogts," was next visited; he has a nursery of White French, Green Grape and Muscadel grafted on Aramon, all looking well at present. A patch of 4,000 Muscadel, last season's planting, on Aramon, looking fair, although a number died off just after they were planted. These vines are all irrigated and are on deep loamy soil with gravelly bottom. Most of the bearing vines are ungrafted; any future plantings will be on resistant stocks.

The practice of growing beans, potatoes and other annual crops, as is the custom in this district, between the vines is not to be commended.

At Mr. G. Malherbe's "Middle Plaats," Muscadel on mixed stocks doing fairly well, but suffering from oidium. Young vines before coming into bearing are generally neglected in the matter of treatment for oidium, which is false economy. The same treatment should be given to them as to those in bearing. Vines on fairly stiff soil with good natural underdrainage.

Mr. E. C. de Wet's "Orange Grove," Robertson township. Grafted vines consist of Muscadel and Sultana on Metallica, planted on a deep-made river bank soil, under irrigation, doing well.

At "Roodewater," belonging to Mr. G. van Graan, a number of Aramon X Rupestris; Metallica, Jacquez and Riparia, as a mother plantation are not doing well. This may partly be accounted for by the soil on which they are planted, not having been properly prepared to ensure good growth. In nursery of Muscadel on Metallica there is a big percentage of misses due mostly to the bad tying of the grafts. White French on Aramon have not made good union; rather poor grafting; and roots from scion have not been cut. Black Prince on Aramon badly tied, look fairly good, where they have taken. On same farm in village, Muscadel on mixed lot of Americans doing badly in wet spots, looking well in limestone portion of vineyard where soil is drier and naturally drained; about one acre of Othello (self-bearer) in stiff clay soil doing well and carrying good crop. Mr. Van Graan has about 90,000 vines, a very small proportion of which are grafted. The outlying portion of "Roodewater" consists of [illegible]t, pretty stiff vlei soil.

On Mr. Marais' farm, over William Nel's River, a patch of Muscadel on Metallica in deep, loose, well-prepared loam looking remarkably well. In fact the finest looking vines that I have seen for their age (1½ years) in the district.

In most vineyards of this district the proportion of grafted to ungrafted vines is still small. The phylloxera is making rapid headway among the ungrafted stocks and in a few years the whole of these areas will have to be reconstituted if the district is to maintain its position as a wine-producing centre.

I also visited Mr. Paul de Wet's farm at "Zand Vleit," and found that the whole of his vineyard is still composed of ungrafted vines, as phylloxera so far has made little headway in the sandy soils of that part.

Mr. Van Westhuisen's farm at "Goud Mijn" was also visited. He has no American vines, as his intention is, when phylloxera destroys the vineyard, to lay it down in lucerne.

MONTAGU, JAN. 11, 1907.

On Mr. Malherbe's farm in the village I found Muscadel on Riparia doing very well and 4-year-old Muscadel on Metallica good. In a patch of Hanepoot, grafted part on Jacquez and part on Riparia, those on Riparia struck much better than those on Jacquez. Both grafted *in situ*.

Mr. D. J. G. Joubert suffered severely from recent floods through having 3,000 grafted vines washed out of his Nursery, practically his whole stock. In his vineyard Muscat Hambro' 4 years old on Metallica, growing well but carrying light crop. In patch of 4-year-old Muscadel growing on Metallica odd ones dying off without any apparent cause. Probably insufficient drainage.

Muscadel, Hanepoot and Waltham Cross on Jacquez, with potatoes planted between the rows, doing well. Some Muscadel and Waltham Cross on Aramon also good.

These vines are growing on very fine close-packed silt soil. Deep trenching would improve its physical condition and help the draining.

In the village Mr. A. J. Rossouw has 2-year-old Muscadel on Metallica, and considering the slight amount of cultivation they get they look exceedingly well.

At Mr. D. S. du Toit's "Old House," a patch of Muscadel in vineyard near the road, 5 years old on Metallica, doing well except on brak spots of restricted area where they die out altogether. These spots have been several times re-planted with the same result. There are a great number of these brak spots throughout the vineyards in the districts of Robertson and Montagu. No varieties of Americans that have been tried so far have succeeded. I would suggest that "Solonis" or some of the Solonis hybrids, if obtainable, be tried in these spots. It is the only variety likely to do any good. In the 7-year-old portion of the vineyard the same thing as regards brak obtains.

Practically nothing has been done at Montagu in the way of reconstitution. The few grafted vines that have been put in are on new areas, and from what I could learn they are all centered in the township. I, therefore, did not visit any of the outlying vineyards.

The delegates who were appointed to accompany me, through various reasons could not do so, but they kindly placed a cart and driver at my disposal, with the exception of the trip to "Zand Vleit," which was done with a hire.

The whole of the farmers with whom I came in contact seemed very keen on the matter of resistant stocks and anxious for information which I gave them to the best of my ability.

BUSHES OF THE KARROO AND FEEDING VALUES AS COMPARED WITH CULTIVATED CROPS.

By R. W. THORNTON, Agricultural Assistant.

The following is a short sketch dealing with some of the more important, desirable and undesirable, bushes of the Karroo, their feeding value as compared with cultivated crops and the disabilities under which they are expected to flourish and maintain their present standing without assistance or the least care being taken to prevent their entire extirpation. The destruction and ousting of our desirable Karroo bushes from the veld is due to several reasons, or rather a combination of causes leading to this effect. Over-stocking more especially during severe droughts causes many of the old bushes to succumb, and as the same veld is grazed at every season of the year and every year during seeding, the seed and flowers being as a rule the parts most greedily devoured by stock, it necessarily follows that the re-seeding that would take place under natural conditions is prevented, and undesirable bushes, which go untouched by stock, flourish, re-seed and spring up on those parts denuded of useful herbage.

This evil may be prevented or at least minimised in several ways, two of which are:

(1) Allowing the veld on a portion of every farm to seed each season and taking care to avoid over-stocking at all times;

(2) Jackal proof fencing, which is now making such rapid strides, permits of stock running night and day, obviates the necessity of tramping veld by driving stock to and from the kraals and water. The denudation of seed and flowers is then not so wholesale.

This destruction of the good bushes also gives rise to the multifarious sluits carrying off silt-laden water, the essence of the noted fertility of the Karroo. To obviate this unnecessary waste, the aim must be to cover the surface of the Karroo densely with the more useful Karroo bushes and grass. Attempts have been made and are being made by some of our more progressive farmers, such as Messrs. W. Southey, — Rubidge, A. and T. Murray, — Wegner, Paul Nel, Claude Orpen, and doubtless many others, to improve and preserve the natural herbage of the Karroo, by netting and flooding, etc., with marked success in some instances. It would be of great benefit to the country if farmers generally, possibly through their Associations, would take the matter up and endeavour to spread certain of the best plants and to preserve those that are remaining. This question was once raised by the Zwaart Ruggens Farmers' Association. With this object in view the following notes on the more important bushes and trees of the Karroo are given, and, by comparison with cultivated crops, their extraordinary feeding values and fattening properties are shown. It is hoped that the urgent necessity of preserving and spreading these valuable shrubs will be realised.

For the sake of convenience these plants are arranged and divided into four groups:—(*a*) Trees; (*b*) medium sized shrub; (*c*) small bushes, kort Karroo; (*d*) useless bushes, *i.e.*, from a grazing point of view.

Group (a).—Trees such as:

(1) Spekboom (*Portulacaria afra*, Jacq.).
(2) Sweet Mimosa (*Accacia horrida*).
(3) Wolvedoorn.
(4) Theunabosch.
(5) Guarrie (*Enclea lanceolata*, E. Mey.).
(6) Witstam boom.
(7) Karee boom.
(8) Kameel doorn, and many others.

Group (b).—Defined as medium sized shrub.

(1) Genaadt bosje (Wild pomegranate).
(2) Rosijntje Bosch (Raisin bush).
(3) Krudoorn Kreedom.
(4) Vaal bosch (Grey bush) (*Tarchonanthus camphoratus*, L.).
(5) Zwart Storm (Black Storm).
(6) Baviaan bout Ganna or lang Ganna (not relished by stock).

Group (c).—Given as small bushes or kort karroo, is the most important, containing as it does bushes that grow in the greatest profusion and under the most varied conditions of soil and climate experienced.

(1) Draaibosje or Gom bosje (*Diplopappus filifolius*).
(2) Schaapbosje or Goede Karroo (*Pentzia virgata*).
(3) Kool Gabba, Cabbage Ganna.
(4) Regte Ganna (*Caroxylon aphylla*).
(5) Vijgebosch (*Mesembrianthemum tuberosum*, L.).
(6) Vaal Brak Ganna (*Atriplex Halimus*).
(7) Kouwgoed, Koudigoed (*Augea capensis*).
(8) Vaal Karroo (*Phymaspermum parvifolium*, Bth. and H.K.)
(9) Blaauw bloemetjes Karroo.
(10) Stroop bosje.
(11) Aarbosje (*Walafrida geniculata*, Rolfe).
(12) Bostard Aarbosje.
(13) Rooi Ganna.
(14) Kapok Bosje (Snow bush) (*Eriocephalus spinescens*, Burch.).
(15) Vingerpol (Finger tuft) (*Euphorbia*, sp.).
(16) Ink Bosje.
(17) Kraalbosje or Kraal ganna.

Group (d) contains the names of a few of the useless bushes of the Karroo, some of which are spreading with such alarming rapidity in certain districts as to menace pastoral farming.

(1) Bitter Karroo (*Chrysocoma tenuifolia*).
(2) Sour Mimosa.
(3) Rapiusbosch.
(4) Rhenosterbosch (*Elytropappus Rhinocerotis*, Less.).
(5) Malmeidbosch (a species of crassula).
(6) Drie Doorn.
(7) Litjes Ganna, Jointed Ganna (*Mesembrianthemum*, sp.).
(8) Kruidge-Roer-mei-niet (*Melianthus comosus*, Vahl.).

The following are the results by analyses of a few of the abovenamed plants, which were carried out by Dr. C. F. Juritz, Senior Government Analyst, and published in 1893. Compared with the analyses of certain well-known European fodder crops it is clearly shown why the apparently barren Karroo with its small rainfall and hot summers afford such fattening pasturage. The comparatively large amount of water shown to be present in these plants probably accounts for the fact that stock on the Karroo often manage for two or three days without water, springboks and ostriches apparently doing entirely without this precious fluid during times of scarcity, and, like fowls that are forced to eat moist food for the sake of the water present, are fatter in consequence. The following analyses were made from fresh plants and plants cut and dried in the open air—the latter dried form is the state in which the Karroo bushes are more usually found.

FEEDING VALUE OF SOME KARROO BUSHES AS COMPARED WITH CULTIVATED CROPS.

	Fresh Plant.					Air Dry.					
	Water.	Digestible Carbo-hydrates.	Albumen-oid.	Inorganic Salts.	Cellu-lose.	Water.	Digestible Carbo-hydrate.	Albumen-oids.	Inorganic Salts.	Cellulose.	crude fat
Draaibosch ...	24·43	52·74	1·87	8·11	12·85	7·21	64·75	2·30	9·96	15·78	
Schaapbosch ...	26·64	49·25	1·79	12·82	9·50	8·13	61·67	2·24	16·06	11·90	
Kool Ganna ...	35·85	44·14	3·46	7·65	8·90	6·88	64·08	5·02	11·10	12·92	
Regte Gannabosch ...	77·49	9·67	·79	5·45	6·60	6·05	10·36	3·29	22·75	27·55	
Vijgebosch ...	82·34	10·56	1·18	3·36	2·56	12·31	53·62	5·88	16·68	12·71	
Vaalbosch ...	82·78	11·11	·82	4·18	1·31	9·22	57·53	4·33	22·02	6·90	
Kouwgoed ...	94·44	2·12	·29	2·81	·34	14·98	32·44	4·57	42·94	5·07	
Lucerne ...	74·0	9·2	4·5	2·0	9·5	15·0	37·3	14·5	6·5	26·7	
Sorghum ...	81·80	10·99	2·19	0·99	4·03	...	60·5	12·0	5·4	22·1	
Rape ...	87·06	4·64	3·13	1·61	3·56	...	35·9	24·2	12·4	27·5	
Mangold ...	88·00	8·71	1·40	0·76	1·13	...	75·2	11·7	3·7	9·4	
Beans ...	...	...	...	...	...	14·4	48·9	25·0	3·2	6·9	1.6
Oathay ...	...	...	...	...	...	15·0	40·2	10·2	6·2	27·6	0·8

From the foregoing table, where a few of the best known Karroo bushes are compared with the forage crops most commonly used and grown in this country, it will be seen that the natural herbage compares very favourably with the cultivated crops.

Selecting first the carbohydrates, which form the principal fat-producing ingredient in all fodders, it is a notable fact that in this ingredient the Karroo bushes all compare favourably with the cultivated crops.

The inorganic matter and cellulose found in the bushes also compare favourably with that found in the forage plants. This was hardly to be expected, considering the decidedly woody and comparatively leafless character of the Karroo bushes.

The one ingredient—and a most important one—in which all the Karroo plants analysed are decidedly deficient, is the albumenoids. The muscular tissue—"hard flesh," as it is often expressed—is produced by this albumenous matter. This deficiency of albumenoids brings to light the reason, well known to most farmers, that a horse grazing on the veld will not, as a rule, stand hard work. The horse may be in excellent condition, but not in hard working condition, and even after one hard day's work—if he will stand the strain—will look thin, hence the necessity of oats or other hard food as an adjunct to the veld for working animals.

The albumenoid ratio, that is, the proportion of albumenoids to the other ingredients present in the plant, is the standard by which the suitability of a fodder for any certain purpose is gauged. Without a sufficiency of any one ingredient the animal cannot make full use of the others, which therefore go to waste. Different animals and animals used for different purposes require ingredients in different proportions. Thus for a horse undergoing severe exertion a suitable ratio is 1 : 4-5, whereas to maintain sheep and cattle 1 : 12-14, and for fattening oxen and sheep 1 : 9-10 is suitable. The veld does not compare badly with the latter figures given, 1 : 12-14 and 1 : 9-10, and hence it follows that, though excellent for fattening or the up-keep of stock, the veld is not suitable for hard working stock without supplementing with grain or other fodder.

Taking the groups A, B and C, which include some of the best scrub and trees for pasturage in the country, it is most desirable to further the spread of these bushes by every possible means, and to prevent the spread of the objectionable bushes grouped under D.

With this object in view, the following notes on the habits, growth, propagation, etc., of these plants are appended. One of the most important is Spekboom (*Portulacaria afra*), of which there are two varieties, very similar in appearance. The one variety is practically worthless for stock. It is redder in colour, has an acrid taste, and draws the mouth, not the pleasant, sharp acid flavour of the good variety. By these points it may be distinguished from the "goede" or "regte spekboom." The desirable variety is destroyed by stock to a great extent, especially during droughts, when every animal preys on it, the thick succulent leaves and young green shoots forming a very attractive and palatable diet, greedily devoured by all stock, but more especially by horned stock. Horses also readily take to grazing this shrub. Angora goats grown on a spekboom farm are usually known by their early and remarkable development. The tree can be readily propagated by means of slips. The seed is difficult to collect, as it is quickly shed and is short lived. The spekboom grows and flourishes on the dry broken stony ridges and hillsides of many of the Karroo districts. The large, dense patches of good spekboom, which are annually becoming smaller, owing to constant grazing, as many of the older farmers can testify, can be regenerated, and fresh areas, if protected, planted with slips.

There are two varieties of mimosa (*Accacia horrida*), the desirable "sweet" mimosa and the undesirable "sour" mimosa. The sweet mimosa or "zoet doorn" is an excellent fodder plant. In good seasons, especially, it bears a vast quantity of flowers and seed, which are greedily eaten by all stock, but are particularly relished by ostriches and goats. The leaves are also excellent, and when these drop off at the fall of the year they are eagerly sought for by sheep and goats. The sour mimosa, on the other hand, is not so greedily eaten by stock. It is distinguishable from the good mimosa by its shape.

But the surest distinguishing feature is the peculiar smell arising from the wood of this tree when newly cut, from which is probably derived its name, "zuur doorn."

Thorn veld is usually described as warm veld, the trees becoming more stunted in the open and disappearing entirely in the colder veld. The mimosa may be readily propagated from seed, which is easily collected and raised. It is not, however, as drought resistant as the spekboom.

Wolvedoorn.—This comes into leaf very early in the year, *i.e.*, in winter, when the mimosa and other trees are leafless, and it in turn is leafless when the mimosa is in full foliage. For this reason it is very useful for Angora goats, etc. The wood also makes desirable fencing poles,

and, like many durable woods, is very slow-growing. This tree may be propagated from seed, and is very drought resistant. In this respect the Whitstaan, Guarrie, and Theunebosch may be bracketed in one class, whereas the Karree Boom, Blaauw Bosch, and Mimosa are generally indicative of the presence of moisture, and do not withstand drought in a like degree.

In *Group B* four of the best known bushes are Genaat, Kree doorn, Rosijntje Bosch, which are found in many parts of the Midlands and through Bechuanaland. All these bushes may be propagated from seed. Vaal bosch and Zwart Storm resist drought best. The Zwart Storm, with its brilliant red flowers, is principally eaten by goats, and that mostly in times of excessive drought. This bush has a brackish, astringent taste. The Vaalbosch is more readily eaten by goats and cattle than by sheep.

Group C consists of numerous short scrubby bushes, and in it—as also in the other groups—the same plants are frequently known in different districts by different names. Of this group only a few of the best and best known and most drought resistant bushes will be commented upon. Schaapbosch, *i.e.*, "Regte Karroo" or "Pentzia virgata," is a Karroo bush growing extensively on many farms in the Somerset East, Graaff-Reinet, and other districts. A very fine stretch of Pentzia is to be seen in the Somerset District between the town and Baintjes Hoogte. It thrives on argillaceous flats where the soil is rich and not easily washed out, and has a fair amount of lime present. It gives place to the Draaibosje, Kapokbosje, and other shrubs on the ridges and poorer soil. The Pentzia bears an abundance of seed, which is easily gathered, and self-seeds. It often comes up very thickly after good seasonable rains. It also increases very rapidly by a process of natural layering, the branches extending along the ground, taking root at the tips. Unfortunately, this mode of propagation is becoming even more rare than that of being allowed to seed, as the stock graze until the branches are a mere bundle of sticks. This layering is a point of great value, as by forming a mat and resisting the silt the process of erosion is suspended and the water and silt remain. This Karroo bush is one of our most drought resistant and valuable stock bushes.

The Vaal Karroo (*Phymaspermum parvifolium*) grows well in the poor stony ground, which will not support the "regte Karroo," and is considered quite as good as the latter for stock. The seed is easily collected. This variety of Karroo does not, however, possess the power of extending and matting by means of layers possessed by the "regte Karroo." Vaal Karroo is also excessively drought resistant, and is found growing extensively in the North-west of the Colony.

Draaibosje or Gombosje (*Diplopappus filifolius*) grows in great profusion on rocky hillsides, and is well known by its blue flower and bright green foliage. It bears a great quantity of seed, which grows well if scattered in suitable spots in the veld. When this bush comes into flower it gives the meat of slaughter stock a strong and unpleasant flavour and smell, which, however, soon disappears if the stock are run on other veld for a short time. As will be seen by the analyses, this is one of the best bushes we have for fattening stock.

One of our best and most drought-resistant bushes is the regte or kortbeen ganna (*Croxylon ~~salsola~~?*). Like regte Karroo it grows socially, that is, in extensive patches, and the patches end as suddenly as they begin, individual bushes seldom straggling away for any great distance from the main area. This social tendency seems to be largely controlled by the nature of the soil, as the plant flourishes on wide alluvial flats in the river valleys of the Midlands and many other parts of the Colony.

It is a noteworthy fact that even when the Karroo bush is dry and black this ganna still retains its small fleshy grey foliage, forming a valuable feed in times of scarcity.

There are many different kinds of Vijge bosje (*Mesembrianthemum*), of which the so-called regte vijge bosje is a variety. It is not unlike the drie doorn—also a vijge bosje—in appearance, but distinguished from it by being thornless, and, as a rule, growing singly and not in patches, as does the drie doorn. It possesses a thick tap-root, often as thick as a man's wrist. It seems to be unaffected by drought. It seldom grows more than 12 inches high, and is, as a rule, entirely denuded of foliage by stock. In times of severe drought cattle are often seen chewing and pawing at the root which sometimes protrudes several inches above the ground. Unfortunately as this bush is seldom permitted by the stock to seed it is not at present known to what extent the seed could be obtained and how the same would germinate and grow.

Of the useless bushes which, though possibly innocuous, are objectionable in that they occupy land where better bushes might grow, little need be said. Some of those that are to be most feared and that are making the most rapid strides are Rapius, Rhenosterbosch and Bitter Karroo. The latter, however, decreases when overstocking and tramping out of veld ceases. It is, however, a pity to see how this bush has encroached on the good Karroo and grass veld; this is especially noticeable in parts of the Barkly East district.

Rhenosterbosch and Rapius are remarkable for their burning quality, but, unfortunately, burning does not seem to destroy all the seed. These two bushes, which take up the veld to the exclusion of practically all other useful herbage, promise in certain parts to become almost as formidable to farming as the prickly pear unless some means is found to check the spread and replace them with good bushes.

The numerous other bushes included amongst those styled generally kort Karroo would take too much space to enumerate the special circumstances under which they thrive or the particular reasons and peculiarities for which each is noted, and the first or second place which they take in the districts where they flourish, but nevertheless each is known and valued for some reason such as drought resistance, for the season at which they supply the special grazing for the lambing season, or for other reasons, but they are one and all worthy of note, care and preservation in a greater or lesser degree.

If established in localities suited to the peculiarities of each it is likely that many of the present useless barren stretches of country might be turned into excellent grazing ground, and if patches of bush veld were established on farms in some of the grassveld districts it would be of the greatest assistance to the farmers during winter, times of excessive drought, and when all the soft grass has been destroyed by locusts, as "bosjes veld" is seldom in such a condition that it will yield no grazing. Even without artificial sowings certain of the bushes have appeared in districts where they were not previously known and have gradually spread. This is a fact well known and often mentioned by many farmers.

DATA REQUIRED FOR CHOOSING A WINDMILL FOR IRRIGATION PURPOSES.

By F. E. Kanthack, A.M.Inst.C.E., Director of Irrigation.

When purchasing a windmill for irrigation purposes, farmers are very apt to go wrong through selecting one which is too small or otherwise unsuitable and whose irrigating capacity will, therefore, not come up to expectations. I have come across many cases where farmers have been greatly disappointed with the results, which have been far below what they anticipated and often what was promised them by the firms selling the windmills.

When working out a windmill irrigation scheme, there are four main points which must be considered in sequence.

Firstly: It must be determined how much water is available for irrigation. If the area of irrigable land is very limited and the supply of water great, this factor is not so important as when the area of irrigable land exceeds the capacity of the water supply. There are also limits to the capacity of a single windmill: thus, 8,000 gallons per hour is probably the limiting capacity of a twenty foot windmill in the Karroo, working on a lift of from twenty to twenty-five feet. If capacities such as this or larger are required, then more than one mill is required.

Most windmills are erected over boreholes in this Colony, the capacity of which is generally very limited—an available supply of 100,000 gallons per 24 hours being exceptional. The average estimated yield of water obtained from holes bored by Government drills amounted to about 30,000 gallons per day for each borehole, and in previous years the yield was considerably less.

The testing of the yield is often done in a very perfunctory manner and the result is unreliable, especially when the supply exceeds the capacity of the test pump. If underground water is to be used for irrigation purposes, every effort should be made to arrive at the true yield.

Secondly: An assumption must be made as to the average wind power available during the different months of the year. I say this must be assumed because so far as South Africa is concerned the paucity of data concerning the variation in wind velocity from hour to hour and day to day is most regrettable. There is only one station on the great plateau of this Colony, viz., the First Order Meteorological Station of Kenilworth, Kimberley, which is in possession of an automatic recording anemometer, from the diagrams of which the continual variations in direction, velocity and pressure of the wind can be ascertained. The results of these observations are to be found in the annual reports of the Meteorological Commission. It is not safe to take Kimberley conditions as fully representative of Karroo conditions generally, but until we can get similar observations made at a few other representative stations it is necessary to fall

back on Kimberley. In table A attached (which is reprinted from the Meteorological Commission's Report for 1903) is shewn the monthly mean wind velocities for each hour of the day during the year 1903, which, unfortunately, is the last one for which these records are available. In succeeding years observations have been regularly made, but the results are not as yet published.

In table B, I have computed the average monthly mean wind velocities for each hour of the day for the six years 1898 to 1903. From this table I have prepared table C, which shews during each month of the year the average number of hours per day during which the wind velocity attains certain values. These values range from four miles to twelve miles an hour, and for power purposes all velocities below six miles per hour may be neglected.

Now these tables shew very clearly what a small amount of effective wind power is available for driving windmills. During the six years for which observations exist the maximum wind velocities for any one day were as follows:—

1898	16·9	miles per hour,
1899	17·9	do.,
1900	16·5	do.,
1901	15·3	do.,
1902	15·9	do.,
1903	14·2	do.,

and for short periods of time on particular days the wind velocity reaches considerably higher values, but if the wind is blowing a strong gale the windmill is either put out of the wind or puts itself out of the wind by means of its governor. For purposes of studying windmill working, high gales should really be eliminated from the averages, which they tend to raise without being themselves effective as power producers.

From a study of table C it is clear that, so far as the Kimberley Karroo is concerned, the number of hours per day during which a working wind, with an average strength of eight miles per hour is available, will be as follows:—

Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
13,	11,	9,	4,	7,	4,	6,	8,	3,	4,	4,	9.

Luckily, most wind is available during the summer months, December to March, when water is most required for irrigation, but it will be seen that the irrigating capacity of a windmill is very small during the winter months.

The conclusion, therefore, to be drawn from these data is that from the 1st December to the end of March a mean wind velocity of eight miles per hour will be available for, say, ten hours per diem. During the months May, July and August an effective wind can only be relied upon during seven hours per diem, and during the remaining months the mill will work only during four hours per diem.

These data are of the utmost importance, as makers of windmills and their agents generally assume very much greater average wind power. In the American Text Book "The Windmill as a Prime Mover," by Alfred R. Wolff (New York: John Wiley and Sons, 1900), it is stated that it has been found by experience that it requires, on an average, a wind with a velocity of six miles per hour to drive a windmill, and that the latter will run, on an average, eight hours per day. From this it is safe to assume that one-third of the total wind movement is lost, so far as the work of the windmill is concerned, and the rest distributed on the eight hours of

work. Then taking the average wind movement throughout the United States as a basis, he finds that the average velocity of the wind during the eight hours of work will be equal to 16 miles per hour.

Most of the windmills on the South African market are of American manufacture, and the convenient booklets issued by some of the great manufacturing Companies base their calculations on American data, and their representatives in South Africa, in the absence of local data, often wrongly apply these American figures to South African conditions. It is evident that the average strength of wind movement in the United States is greater than it is on the Karroo, and this being the case, we must base our calculations here on lower wind velocities than is the case in America. Therefore, when agents promise certain results with wind velocities of 12 or 16 miles per hour throughout the day, it is safe to discount such results and ask for very much more reasonable performances.

Thirdly: The area which it is proposed to irrigate must be determined. The land to be irrigated should be as close to the windmill as possible, and if water has to be led any distance it should be carried in pipes or lined channels or flumes. Losses by absorption in open channels are very great and water pumped from a borehole is such a very expensive commodity that all losses should be carefully avoided.

Assuming that there will be no waste in the water furrows and that the lands are very carefully levelled and divided into very small checks or beds, it is possible to water one acre of crop with 50,000 gallons of water. Under more usual conditions of irrigation not less than 70,000 gallons would be required. In determining the area to be irrigated, very much depends upon the crops it is intended to grow, and the first thing a farmer has to decide is the longest period within which the whole area must be flooded. To take an example: supposing a farmer wishes to place 10 acres of land under irrigation in the following manner, viz., lucerne, 5 acres; vegetables, 1 acre; potatoes, 1 acre; cereals, 3 acres; and supposing also he wishes to flood these crops as follows, viz., lucerne every 20 days, vegetables every 5 days, potatoes every 10 days, and cereals four times during the season. With regard to cereals, three of the four waterings will probably be given during the winter, when no other crops require water. In the present enquiry we are chiefly concerned with the maximum demand for water, and this will probably take place in the late spring or early summer, when during the course of 20 days water must be found to flood:—

5 acres of lucerne, once	5 acres.
1 acre of vegetables, 4 times	4 acres.
1 acre of potatoes, twice...	2 acres.
3 acres cereals, final watering	3 acres.
Total	14 acres.

Thus, with 10 acres of cultivation, the farmer would in 20 days have to find sufficient water to irrigate 14 acres. Taking 60,000 gallons as the average minimum amount of water per acre per watering, the total amount required per diem would be $\frac{14 \times 60,000}{20} = 42,000$ gallons. During the period of the year under consideration, pumping could only be carried on for 4 hours in October and November and during 9 hours in December, and it is doubtful whether water would be used for the irrigation of cereals during the two former months, and it is assumed that in the locality under consideration it is still feasible to irrigate wheat during December. The required supply per hour will therefore be $\frac{42,000}{9} = 4,667$ gallons.

In the above calculation a particular area has been assumed and the requirements of water deduced. This calculated amount should be compared with the proved yield of the borehole or other source of supply. As the proved yield is based upon continuous pumping, the requirements per hour, based upon eight or nine hours working of the mill, may considerably exceed the proved continuous yield per hour. The requirements per working day of the mill (say eight hours) should be compared with the total daily yield of 24 hours of the source of supply.

Thus the daily requirements in the example above are 42,000 gallons and the proved daily yield of a borehole should be, I think, at least 10 per cent. more than this amount. When the yield is small, say less than 1,000 gallons per hour, a greater margin than 10 per cent. should be allowed, as the source of supply may be pumped dry and wind power therefore lost. When the supply of water is considerably in excess of the capacity of a single large windmill the advisability of using some other form of power should be considered.

It is easy to start with the available supply of water and determine exactly what amount of irrigation could be done with it, but I think it is simpler for a farmer to work on the trial and error system as given in the example. If his first assumptions are excessive, he must reduce his area or change his plan of operations and make repeated trial calculations till he has arrived at a satisfactory result.

Fourthly: It finally remains to determine the size and capacity of the windmill required. The preceding paragraph will have given the farmer the required maximum capacity, viz., (x) gallons per hour with a wind velocity of (z) miles per hour. In the Karroo, I think, it should always be assumed that the wind power available during the irrigating season will not exceed eight miles per hour and that the mill will not work more than eight hours per day. The maximum lift, the total length of suction and delivery pipes and the required capacity in *English* gallons per hour, together with a general description of the borehole or other source of supply and its situation with reference to the delivery pipes, form the data which should be supplied to the firms from whom tenders are invited. It is for the tendering firms to supply particulars about the plant which they guarantee will comply with the terms of the specification.

Special attention is invited to the fact, not generally known, that the English gallon is larger than the American gallon, the latter being only four-fifths of the English gallon. As most tables relating to windmills are of American origin, and as these generally express the capacity in U.S. gallons, the performances quoted appear to people who think in English gallons, considerably greater than they really are. To avoid misunderstandings, all capacities should be expressed in English gallons whenever dealing with agents who are selling American mills.

TABLE A.

Monthly Mean Wind Velocities in Hourly Values: Deduced from the Records of the Robinson-Henderson Anemograph.

M	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	N	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII	XXIII	M	Max. Day.	Min. Day.	Monthly Mean.
1903.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.	m. per h.
January	6·1	5·9	5·7	5·6	5·9	5·8	6·1	8·4	8·6	8·2	7·7	8·2	8·5	8·4	8·3	7·7	7·8	8·3	6·9	6·1	6·3	6·2	5·9	5·3	12·6	3·3	7·0
February	5·3	4·6	4·6	4·0	4·3	4·5	4·2	5·8	6·9	7·1	7·8	7·6	7·5	7·4	7·7	8·0	7·1	6·3	5·2	4·4	5·2	5·6	5·5	5·3	10·7	2·6	5·9
March	4·3	4·5	4·5	3·9	3·5	3·5	4·6	4·8	6·4	7·1	7·5	7·4	7·3	7·8	8·1	8·2	7·9	7·8	6·1	5·4	4·8	4·4	4·6	4·6	10·5	2·5	5·8
April	3·7	3·6	3·4	3·3	3·1	3·2	3·1	4·2	5·4	5·4	6·0	6·2	6·7	6·5	6·2	5·6	5·0	4·1	4·0	4·3	5·1	4·9	4·7	4·2	7·5	2·2	4·7
May	3·3	3·3	3·0	2·7	2·9	2·8	2·9	2·7	3·8	5·8	6·7	7·2	7·4	7·9	8·0	6·7	4·9	3·2	3·9	3·8	4·1	3·5	3·7	3·3	10·5	1·9	4·5
June	3·5	3·6	3·6	3·5	3·4	3·4	2·9	2·8	4·2	5·9	6·9	7·7	8·0	7·8	7·5	6·8	5·2	3·7	3·5	4·1	4·5	4·2	4·1	3·7	11·8	1·1	4·8
July	3·1	3·2	2·8	2·6	2·8	2·6	2·5	2·6	3·9	5·8	6·6	7·4	7·3	7·3	6·9	6·6	4·9	3·2	3·5	3·4	3·0	2·9	2·9	3·1	9·1	1·7	4·2
August	2·8	2·9	2·9	2·9	3·0	3·4	2·9	3·2	4·7	6·3	7·3	7·8	8·4	8·4	8·4	8·0	6·4	4·2	3·3	3·4	3·8	3·4	3·1	3·0	11·2	1·5	4·7
September	4·0	4·2	4·0	4·3	4·1	3·7	3·7	5·2	7·2	8·2	8·3	8·4	8·5	8·3	8·0	7·5	6·7	5·3	4·2	4·3	4·1	4·1	4·4	4·2	11·6	2·4	5·6
October	5·3	4·7	4·3	4·4	4·1	4·3	5·1	6·1	7·1	7·5	8·3	8·7	9·3	10·0	9·7	9·8	9·9	8·1	6·4	5·7	5·7	5·5	4·8	4·8	12·8	2·2	6·7
November	4·3	4·7	4·6	3·9	3·6	3·7	5·5	6·4	6·7	7·3	7·6	8·3	8·9	9·2	9·1	9·5	8·8	7·9	6·2	5·4	5·2	4·9	4·6	4·1	14·2	2·1	6·3
December	4·6	4·4	4·5	4·4	4·2	4·2	5·8	7·2	7·4	7·2	7·2	6·9	6·9	7·4	7·5	7·5	7·2	6·3	5·1	4·1	4·3	3·8	3·9	4·2	8·6	2·0	5·7
Year	4·2	4·1	4·0	3·8	3·7	3·8	4·1	5·0	6·0	6·8	7·3	7·6	7·9	8·0	7·9	7·7	6·8	5·7	4·9	4·5	4·7	4·5	4·4	4·2	14·2	1·1	5·5

TABLE B.

Showing Monthly Mean Wind Velocities in Hourly Values, computed from the six years, 1898 to 1903. (Kenilworth, Kimberley.)

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	Miles per Hour.											
M.												
I.	5·55	5·45	4·37	3·83	4·07	4·32	4·10	4·45	5·13	5·70	5·45	4·98
II.	5·82	5·17	4·15	3·63	3·85	4·08	3·97	4·38	4·97	5·45	5·27	5·35
III.	5·67	5·28	3·97	3·45	3·73	3·87	3·65	4·30	4·92	5·18	5·13	5·10
IV.	5·45	5·20	3·85	3·22	3·72	3·63	3·63	4·15	4·80	5·20	4·93	4·77
V.	5·15	5·28	3·65	3·13	3·65	3·58	3·55	4·07	4·63	5·00	4·58	4·67
VI.	5·23	5·18	3·58	3·03	3·55	3·66	3·52	4·03	4·62	5·12	4·55	4·78
VII.	5·97	5·62	3·85	3·07	3·65	3·41	3·36	3·88	4·68	6·05	5·88	6·12
VIII.	7·57	6·90	4·88	3·60	3·32	3·27	3·30	4·02	5·87	7·50	7·12	7·13
IX.	8·00	7·60	6·13	4·93	4·63	4·27	4·23	5·55	7·28	8·07	7·42	7·38
X.	8·15	8·02	6·70	5·75	6·05	5·60	5·97	7·07	8·15	8·27	7·85	7·32
XI.	8·13	7·87	6·93	6·22	6·73	6·18	6·80	7·73	8·50	8·73	8·10	7·37
X.	8·17	7·57	6·87	6·52	7·13	6·53	7·20	7·92	9·02	9·02	8·28	7·45
XIII.	8·37	7·40	6·85	6·60	7·30	6·60	7·35	8·00	9·22	9·17	8·72	7·62
XIV.	8·45	7·27	6·85	6·28	7·13	6·33	7·22	7·95	9·18	9·47	9·00	8·03
XV.	8·70	7·40	6·83	5·95	7·02	5·90	6·87	7·63	9·08	9·40	9·17	8·10
XVI.	8·43	7·25	6·70	5·37	6·40	5·43	6·33	7·15	8·63	9·17	9·17	8·47
XVII.	8·38	7·02	6·28	4·63	4·90	4·12	4·82	6·15	7·78	8·80	9·18	8·23
XVIII	7·95	6·78	5·60	3·68	3·42	3·38	3·65	4·37	5·35	7·62	8·55	7·65
XIX.	7·22	5·87	4·42	3·63	3·72	3·87	4.18	4·08	5·28	6·12	6·73	6·57
XX.	6·03	5·27	4·32	4·05	4·28	4·42	4·60	4·55	5·37	5·90	5·98	5·47
XXI.	5·78	5·30	4·42	4·47	4·57	4·48	4·67	4·88	5·35	5·98	5·97	5·33
XXII.	5·70	5·30	4·45	4·47	4·58	4·63	4·48	4·78	5·17	5·92	5·83	5·23
XXIII	5·55	5·47	4·35	4·27	4·70	4·73	4·25	4·53	5·50	5·82	5·68	5·15
XXIV.	5·33	5·38	4·45	4·10	4·13	4·56	4·22	4·53	5·52	5·67	5·18	5·25

TABLE C.

Table showing the average number of hours per diem during which certain Monthly Mean Wind Velocities are attained.

	4 miles per hour.	Between 4 and 6 miles per hour.	Effective: Between 6 and 8 miles per hour.	Effective: Between 8 and 10 miles per hour.	Between 10 and 12 miles per hour.
January	0	11	4	9	0
February	0	13	10	1	0
March	5	10	9	0	0
April	10	10	4	0	0
May	9	8	7	0	0
June	8	12	4	0	0
July	8	10	6	0	0
August	1	15	8	0	0
September	0	14	3	7	0
October	0	11	4	9	0
November	0	12	4	8	0
December	0	11	9	4	0

AGRICULTURAL UNION OF CAPE COLONY.

ELEVENTH ANNUAL CONGRESS.—1908.

The Eleventh Annual Congress of the Agricultural Union of Cape Colony was opened in the Banquetting Hall of the City Hall, Capetown, on Monday, June 22. The chair was taken by the President (Mr. C. G. Lee), who was supported on the platform by the Hon. F. S. Malan, M.L.A., Minister for Agriculture; the Hon. Dr. T. W. Smartt, M.L.A., the Hon. P. W. Michau, M.L.C., Mr. G. H. Maasdorp, M.L.A., Mr. W. Duncan Baxter, M.L.A. (Mayor of Capetown), Mr. H. Liberman (Deputy Mayor), and Mr. T. Theron, M.L.A.

The following is a list of the Delegates:—

Paarl: Messrs. I. A. Perold, C. C. A. de Villiers, and C. Shaw-Nicholson.

Bayville: Messrs. Wm. Jurgens and H. Richards.

Bredasdorp: Mr. J. D. Albertyn.

Aliwal North: Messrs. W. G. Bellairs, J. J. Maynier, S. van Aardt, and J. J. McNally.

Bathurst: Mr. R. W. Estment.

Western Province Agricultural Society: Colonel W. E. Stanford, M.L.A., Messrs. P. A. Myburgh (Paarl), R. Starke (Durbanville), W. T. Wilson, and J. C. Faure (Eerste River).

Cradock: Hon. P. W. Michau, M.L.C., Messrs. M. J. du Plessis, M.L.A., and H. C. van Heerden, M.L.A.

Darling: Messrs. J. W. J. Versfeld and W. F. Duckitt.

Cape Stud Breeders' Association: Mr. C. G. Lee.

Graaff-Reinet: Messrs. G. H. Maasdorp, M.L.A., and J. D. Momberg.

Oudtshoorn: Messrs. E. T. L. Edmeades and H. J. le Roux.

Britstown: Messrs. W. J. S. van der Merwe and Z. Blomerus.

Stellenbosch: Messrs. J. P. Louw and J. T. Starke.

Middelburg: Messrs. G. A. A. Theunissen, W. P. Stahl, J. S. Minnaar, and J. O. Collett.

Cape Flats Farmers' Association: Messrs. Geo. Smit and A. L. Waldron.

Caledon: Messrs. J. S. le Sueur and P. H. Swart.

Cathcart: Mr. T. A. Stephen.

Queen's Town: Messrs. A. M. Fairweather and C. P. Hill.

Robertson and Montagu: Messrs. D. J. de Wet, J. C. Neethling, and A. J. Marais.

Richmond: Messrs. R. P. Botha and B. J. Joubert.

Malmesbury and Piquetberg: Messrs. W. P. Penberthy and P. G. Nelson.

Worcester: Messrs. C. Heatlie and G. W. Gie.

Humansdorp: Messrs. J. M. Rademeyer, M.L.A., and Henry Swart.

Wodehouse: Messrs. O. S. Vermooten, M.L.A., and J. A. Venter, M.L.A.

Tulbagh: Messrs. E. J. Euvrard, P. L. le Roux, and J. F. Theron.

East London: Col. Crewe, M.L.A., and the Hon. A. J. Fuller, M.L.C.

King William's Town: Messrs. Jos. Clarke, G. Whitaker, M.L.A., Col. Warren, M.L.A., and F. Ginsberg, M.L.A.

Port Elizabeth: Messrs. C. E. Geard, R. Watson, and J. Woodin.

Koonap Heights Farmers' Association: Mr. F. W. Douglass, M.L.A.

Albany: Messrs. H. Fitchat, M.L.A., and W. Thomas, M.L.A.

East Griqualand: Mr. C. R. Rennie, M.L.A.

Office-Bearers.—The following office-bearers were also in attendance:—Hon. Vice-Presidents: Messrs. G. H. Maasdorp, M.L.A., the Hon. Dr. Smartt, M.L.A., the Hon. A. Fuller,, M.L.A., D. M. Brown, M.L.A., P. Ryan. Vice-Presidents: The Hon. P. W. Michau, M.L.C., Mr. J. Rawbone. Executive Committee: Messrs. F. C. Bayly, John Daverin, J. G. Sieberhagen, M.L.A., E. M. Warren, T P. Theron, M.L.A., E. T. L. Edmeades, P. R. Malleson, R. H. Struben, D. M. Hugo, T. T. Hoole, D. J. Albertyn, A. W. Douglass. Government Representatives: The Director of Agriculture (Mr. J. Noble Jack), the Chief Veterinary Surgeon (Mr. Borthwick), the Government Entomologist (Mr. Lounsbury), the Agricultural Assistant (Mr. Du Toit), the Horticultural Assistant (Mr. Pillans), the Superintendent of Co-operation (Mr. P. J. Hannon), the Editor, 'Agricultural Journal" (Mr. F. D. MacDermott), who is also hon. secretary to the Union.

THE OPENING CEREMONY.

The President of the Union (Mr. C. G. Lee), in introducing the Minister for Agriculture, said whatever might be thought of their actions in the past, and whatever might come from it, they felt that having the Minister for Agriculture there was a certain amount of recognition by him of the work of the organisation. It was comforting to them to have him present, for they knew in regard to their future that his attendance would help forward the work that they had in hand. Holding those views, they were very pleased indeed to see him. Whatever he had on his mind, whether pleasant or not, they wanted to hear, and they wanted him to keep nothing back from them. He then called on the Hon. Mr. Malan to declare the Congress open.

THE MINISTER FOR AGRICULTURE.

The Hon. F. S. Malan, who on rising was received with cheers, said he was very pleased with the kind introduction which the chairman had given him, and he hoped closely to follow their discussions and to gather as much information as possible, because he recognised that unless they were in close touch it would be impossible for the department adequately to serve the country. He heartily welcomed the delegates to Cape Town. They met almost simultaneously with Parliament. He could almost say that he saw before him the Agricultural Parliament of the country. He regretted, however, that he could not say that altogether, for the simple reason that there seemed to be a division in the Agricultural Parliament and whilst a few months ago there was one section meeting at Kimberley under the auspices of one association, that morning he saw another association meeting in Cape Town under a different banner. He regretted that; he said it frankly. He would like to welcome an Agricultural Par-

liament for the whole of Cape Colony—(hear, hear)—and he believed, that though they had gone on in the past on three different lines, more or less parallel, the time had come to really seriously consider whether they could not make those parallel lines converge to one point. It had been in the air for some time; it had been discussed formally and informally for many years. The late Dr. Hutcheon, whose services they could not over-value, put his whole soul into that, but somehow the time did not seem ripe for it. He (Mr. Malan) saw amongst the subjects for discussion a proposition for Closer Union. Closer Union was in the air politically; let it also be in the air agriculturally—(hear, hear)—and to give the matter a practical force he would suggest that their Congress should appoint a committee with full powers to meet the delegates from the Farmers' Association Congress and the Horticultural Congress, and frame a constitution which could be submitted to them later on. If such a resolution were passed there, he believed, they would be able to come to some finality in that matter. He could not go into details of the question then, but if the thing came to a conference of delegates, who had power to deal with the question, he had very little doubt but that the common-sense of the people of the country would be sufficient to meet the difficulties which there were in the way, and that they should get to that Closer Union which they so heartily desired.

There was one other question he would like to refer to, and that was the number of agricultural shows. He knew that this was no easy matter, and that it had been considered from all points of view, the question being how could they reduce the number of their shows, and the expenditure, waste, and over-lapping which there undoubtedly was? How could they prevent a man sending the same stock from one show to the other and sweeping the board with the same animal? Another aspect of the question was how could they get a sufficient number of experienced men to judge at all the shows? Perhaps a solution might be found in this direction—and he threw it out for the sake of discussion—and that was that something might be done by organising the shows and having different scales of Government contributions for the different kinds of shows. First there should be the local shows confined to one district, and they should have as many of these as they liked. (Applause.) Then there should be circle shows, and Government should declare that within a particular area or circle there should be only one show to which it would contribute on a higher basis. At present in the Western Province there were district shows open to the whole of the Western Province at Paarl, Stellenbosch, and Malmesbury. (Cries of "Not Paarl.") If they said that there should be only one circle show within a particular area once a year, that did not mean that it would be held in the same place every year. Supposing Paarl, Stellenbosch, and Malmesbury went together, if in one year the central show was held at Paarl a local show would not be held there that year. The next year they could have the circle show at Stellenbosch, and the district show at the Paarl, and thus keep alive interest in that way. Finally they should have a general show for the whole of the Colony, which might be held in Cape Town one year, at Port Elizabeth another year, at East London another year, and Kimberley another year. Or they might say that it would be better to have three large shows each year—at Cape Town, Port Elizabeth, and East London—open to the whole country. It seemed to him that in this manner they might, perhaps, reduce the difficulties that were in their way. It was quite possible that some of the local shows would drop out at least for a time. In the year 1906-7 over thirteen thousand pounds was contributed by the Government to the different shows, all on the same basis. This year the amount had been reduced to £3,000, for they had not got the money, so

that the thing would probably come up in some form or another. If they could not go in their phaeton they must be prepared to go in the old Cape cart, and the matter of expenditure in connection with those shows would certainly bring the societies to recognise that there might be something in that idea of co-ordinating their shows. In connection with the subject of sheep farming, he would like to say a word with reference to the seriousness of the droughts, and as to whether they could not be overcome. They seemed to hear the word "drought" more frequently than they did formerly. Some said that was because it did not rain so often; others said it was because the vleis had been exhausted and all the water rushed off to the sea. He knew a great deal might be done by artificial feeding, and whenever he found the farmers utilising the flood-water and not allowing it to run over the land to run off again, but to dam it up—whenever that was done a great deal was done to the veld, and they got a crop which they could use for winter feeding. A second idea was: must they continue as sheep farmers to produce wool and wool only, or must they also see to their meat market? In New Zealand they were exporting lambs to the extent of two millions per annum to the London market; there they went on the principle that they must limit their stocks, and as soon as they reached that limit they killed off and exported the rest. There was an idea, rightly or wrongly, in that colony, that the sheep farmer's wealth was the number of sheep which he had got on his farm. That might have been so in the past, but at the present time it might be his downfall, and the question was whether they should not consider the idea of saying that their pasturage would carry so many sheep, and that as soon as the number went over that, it was to their interest to sell a hamel at 15s. rather than to keep him until they got a sixpence more, or perhaps lost him through the drought. (Hear, hear.) That was what was happening too often in this country—(applause)—sticking out for a small rise and then losing the whole of the sheep. Producing wool was one thing and producing meat was another. They could not expect that a sheep which would give them a good lot of wool would also be so profitable in giving them meat which they could send to the London market. They must study the market and consider its requirements.

He now wanted to say a word with regard to East Coast Fever, which was a terrible scourge on our borders, and Government was doing all it could to keep the disease out. He would say, more particularly to the people living along the coast, "Let this danger of disease impress upon your minds more than anything else the importance of fencing. (Applause.) Fence your farms, and you need not fear the fever. If you confine your animals on your own farm, and have your farms fenced so that no other animals can come in, you need not fear this danger, which is a very serious and grave one." However, if this fever led to the fencing of farms it might almost be considered a blessing in disguise. With regard to jackals, he believed that the erection of jackal-proof fencing was a better way than paying for their tails. (Applause.) The one would lead to their getting clear areas, but the other might lead to the breeding of jackals. In conclusion, Mr. Malan wished the Congress every success in its deliberations. He had much pleasure in being amongst them, and he would like to stay and listen to all that they had to say, but his duties called him away. He hoped that there would be closer union among the different agricultural bodies, and that a united body would do grand work for the future of South Africa. (Applause.)

The President, having thanked the Minister for Agriculture for his presence at the Congress, introduced the Mayor of Cape Town.

THE MAYOR'S WELCOME.

The Mayor of Cape Town, in extending a welcome to the delegates on behalf of the citizens of Cape Town, said they were always glad to see an important Congress such as the Congress of the Agricultural Union in their midst, and particularly were they glad when men came together in a spirit of earnestness, which was obvious in the present instance, to consider the welfare of so important an industry as agriculture was in this country. The people of Cape Town were going to follow the deliberations with a great deal of interest, because they were looking to the farming community to help them out of their difficulties. (Laughter.) They were looking to the farmers to help the old Cape cart out of the rut, as the saying went, and to see that the country was conducted on modern lines, and thus do away with the depression. He did not intend to infringe on agricultural matters, as he was not a farmer. He would like to say that if at any time any of the delegates desired to inspect the Municipal works of Cape Town, the Council would be glad to place the facilities for doing so at their disposal. He concluded by repeating his welcome to the delegates to the mother city of South Africa. He trusted that their deliberations would be attended with the success for which they hoped, and that their visit to Cape Town would bear good fruit.

The President moved a hearty vote of thanks to the Mayor for his hearty reception, and assured him that it would be thoroughly appreciated by the delegates present.

The Secretary for Agriculture mentioned that while Congress was sitting, the officials of the Agricultural Department would be at their disposal.

An adjournment was then made to the Library, where the business of the Congress was at once begun.

ANNUAL REPORT.

The hon. secretary read the Annual Report as follows:—

Gentlemen,—Your executive regrets very much that it is not within its power to congratulate the agricultural and pastoral community of this colony so warmly on the assembling of this Congress as was its pleasurable privilege last year. During the intervening period the bright prospects have become overcast, and the general depression which has hung over this country for so long now threatens the agricultural interests in nearly every branch. Severe drought in some sections of the country and a general fall in most of our markets, both at Home and abroad, have brought about a complete change. Not that the outlook is altogether gloomy, but compared with this time last year, it is considerably dimmed. The political crisis and the prolongation of the General Election contributed somewhat towards curtailing the activities of your executive during the past year, and though a great deal more might have been done, had it not been for these disturbing factors, yet something has been accomplished towards forwarding the aims and objects of this Union.

Shortly after last Congress the Hon. the Minister for Agriculture called the executive together to consult as to the allocation of the grants in aid of the agricultural societies, which had to be considerably reduced, owing to the straitened condition of the public finances. After lengthy deliberation and discussion, it was decided to advise the Government to distribute the grant *pro rata* to all societies holding shows on the basis of the actual prize money paid out. This recommendation was formally submitted to the Minister for Agriculture, and adopted by the Government in allocating the sum voted.

At the same meeting a question of some importance was raised in connection with the practice of taking exhibits from show to show in the same season, and thus securing a very large number of prizes for the one animal, or group of animals. It was represented as undesirable, and as tending to the encouragement of a class of professional exhibitors. After some discussion, it was decided to advise the Government that, in the opinion of the executive of this Union, it was desirable that no single exhibit should be allowed to draw money prizes, towards which the Government grant contributes, at more than three separate shows in the one season. But that provision might be made by which any such exhibit competing at any show, after having won at three previous shows during the same season, could be placed in its order of merit, and be awarded such recognition as the society concerned might think fit. This recommendation not to apply to machinery and implements for agricultural purposes. The recommendation was acted upon by the Government.

Your executive regrets very much to learn that, owing to the continued depression, the amount placed on the Estimates for the next series of agricultural shows is still less than that voted last year. The amount voted for the season recently closed was £5,000; that for next season has been reduced to £3,000. This means that the grant for each society will amount to three-fifths of that received last season, if the same number of shows are held.

As the allocation of show dates has been the cause of much misunderstanding, the secretary has prepared a plan, by which some workable basis should be arrived at. The plan, with a memo. thereon, has been before the societies, and will be laid before you when the subject comes up for discussion.

The whole question of judges and judging by points has also been under consideration during the past year, and these subjects fully ventilated among the agricultural societies by circular. The results will be placed before you during this Conference, all the information obtainable being laid on the table.

All the subjects dealt with at the last Congress have been submitted to the various authorities, and the replies to the resolutions are printed in the agenda now before you.

With reference to protecting the seal or mark of the South African Stud Book, your executive finds some difficulty in the way. After full inquiries we find the only really satisfactory method open is by incorporation and this can only be secured by the Stud Book Association itself.

Another subject referred to the executive was the consideration of means by which the better recognition of the authority of the Union could be secured. As negotiations for closer union with other bodies have continued throughout the whole of the period since last Congress, and as later developments hold out some hope of a satisfactory conclusion to that movement, your executive considers that this matter may well stand in abeyance until the larger question is settled.

As more information was asked for on the subject of barren stock at agricultural shows, inquiries have been made, and it has been ascertained that the same subject has been under consideration by the Western Province Agricultural Society. From evidence obtained by a sub-committee of the society, it appears that the Highland Agricultural Society of Scotland insists that all cows (other than Highland cows) "must either be in milk or in calf; if in milk, birth must have been within nine months of the show; if in calf, birth must be certified within nine months after the show." Heifers must be in calf when exhibited, and premiums are withheld till the birth is certified, which must be within nine months after the show. Yeld mares must produce a foal within twelve months of the first

day of the show. Other mares must be shown in classes for gelding or mare. Provision is made for examination in case of death before the progeny is born. Ewes must have reared lambs in the year of the show. Sows must have reared pigs in the year of the show or be in pig. Aged bulls and stallions must have had produce, and along with two-year-old bulls, three-year-old colts, and two shear and aged tups have served within the year of the show. The Royal Agricultural Society of England is believed to work under the same rules. To meet possible disqualifications, judges are directed to award "reserve numbers"—that is, to place in order of relative merit more animals than those to which prizes are given, in order that, if any are disqualified, the awards may revert to the reserves. If the reserve numbers also become disqualified, the prizes lapse.

Your Union was very fully represented at the annual Conference of the Inter-Colonial Agricultural Union, held at Pretoria in October last, when some very useful work was done, and the bonds of good-fellowship between the agriculturists of the various States were still further cemented. This Union may take is as a compliment that your president was specially requested to accept nomination for a second year as president of the Inter-Colonial Union. Copies of the minutes of that Conference, printed in English and Dutch, are before you, and others have been distributed to the various societies affiliated to this Union for circulation among the members.

Your executive deeply regrets to have to announce the death during the year of one of its members, the late Hon. Wm. Rogers, M.L.C., and tenders to the surviving relatives its condolences. In the deceased gentleman this Union has lost a warm supporter and a consistent worker in furthering the aims we all have at heart. Another member of the executive, Mr. W. van der Byl, of Stellenbosch, resigned during the year owing to his change of residence. His services will be very much missed, as he was always willing to do all that lay in his power to help the work of this body forward.

This Union is greatly indebted to the never-failing courtesy and assistance of the Agricultural Department, and your executive trusts that this Congress will not fail to place upon record its full appreciation of the valuable advice and assistance continuously rendered by successive Ministers and every officer of the department, who all seem imbued with the desire to assist this body by every reasonable means in their power.

A very full agenda is before you dealing with most of the more important subjects at present troubling the agricultural community, and it is to be hoped that your deliberations will be guided by that spirit of reasonableness and appreciation of the general conditions of the country which has marked all our previous gatherings. As this promises to be the largest and most important Congress this Union has held, it is unnecessary to comment upon the self-evident fact that the scope of our influence is spreading over an ever-widening field. Your executive is more than pleased to be able to congratulate this organisation upon this fact, and trusts that when closer union may be accomplished the spirit which has always guided this body may be perpetuated, and even extended, in any new organisation in which we may become merged.

THE PRESIDENT'S ADDRESS.

The President (Mr. C. G. Lee) then delivered the following address:—
I have great pleasure in welcoming the delegates to this the Eleventh Annual Congress of this Union, and in doing so feel the pleasure to be greatly

enhanced by the fact that it is by far the largest and most representative gathering we have ever held. It is probably one of the most influential assemblages of those interested in the agricultural industries of this Colony which has ever sat, and I trust that the importance and influence of this Union will continue to increase in order that the people of this Colony may be brought to realise the overwhelming importance of the interests we represent, for now, more than ever, it is being every day demonstrated that if the prosperity of the country is to be established upon a sound and lasting basis it must be through the encouragement and establishment of every form of agricultural industry which is suited to our conditions. Before presenting the Annual Report of the Executive Committee, I trust you will bear with me while I refer to a few of the matters more immediately connected with the work we are desirous of doing. When we assembled last year at Port Elizabeth the immediate agricultural outlook was much brighter than it is to-day. The country is now in the throes of one of those periodical waves of financial depression which sweep over it from time to time; and it is greatly to be feared it will always be subject to such periods of depression until our agricultural resources are more fully developed and established on an unassailable basis. We have experienced such periods on more than one occasion, even during comparatively recent times, when the public finances have been just as seriously embarrassed as they are to-day. Fortunately for the general progress of the country, relief has previously been found through mining and mineral developments. But after a time the depressions recur in spite of these factors, which goes to prove that the relief thus experienced cannot be always relied upon to be of more than a temporary character. No one can quarrel with the policy of mineral development, least of all the farmer, for it provides him, for the time being, with excellent markets, and thus enables him to strengthen his position and add to the general wealth of the community by improving the national asset—the land. But mining alone never made a nation and never will. For mining to be made of the greatest value to any community, it should be accompanied by a wise and statesmanlike policy of using at least a portion of the wealth it produces for the purpose of encouraging the more stable industries connected with the cultivation of the soil. Minerals will always receive first attention because of the promise they hold out of an easy road to fortune, but what may suit the individual may be very costly to the nation in the end. It would, for instance, be a questionable policy for any community to pledge its credit for the purpose of building expensive railways solely to serve the interests of mineral development without imposing some reasonable direct tax on the interests served to provide for the re-payment of at least a portion of the borrowed capital. The present position accentuates this view of the affairs of this country, and I fully believe that the depression we are now passing through will be of the greatest value in guiding policy in the future. At least, I trust it may be so, for the picture conjured up by an opposite state of things is most lamentable. It simply amounts to a contemplation of the time when we shall be burdened with an unbearable national debt mainly incurred for the construction of railways to serve the mining centres, and the trade of those places either much restricted through natural causes or even entirely disappeared. And that burden would have to be borne entirely by the agricultural and pastoral community, for the land, after all, is the only real asset which any State possesses to pledge for its communal indebtedness.

No one can prophesy what may happen in the immediate future, or where or when another mineral discovery may turn up to give a fresh spurt to trade, but if such a thing does happen I for one trust that the lessons of the past will be taken into account and some good fruit may be

the outcome. As such a prospect is highly problematical and as the needs of the moment are most pressing, I take it that we are all agreed as to the unwisdom of sitting still and waiting for something to turn up. A mining boom may help the country to its feet once more, but that help will be all the more sound and substantial if the agricultural and pastoral industries are more fully developed. And as these industries are always with us and will have to be counted upon for all time, it is surely asking very little of those interested and the general community as well to do all in their power to see them established on such a basis that they may contribute their full share to the wealth and prosperity of the country. And then, setting aside all thought of mining or other booms, the prosperity of these two great industries will do more to solve the problem of depression than any other factors within reach of our hands. This, I take it, is the object of such a gathering as this, and I trust that all here present, fully alive to their responsibilities, will keep before them the fact that all proposals for advancement must be based upon the true principles of sound co-operation, self-help and self-reliance if they are to command the respect and attention of the whole community. It was the present Prime Minister, I believe, who recently told a large audience that the only cures for the present depression are Faith, Hope, and Industry, and, he added, the greatest of these is Industry. Truer words have never been uttered, and it would be well for us all to take them to heart, not only in our deliberations here, but in the work of our lives.

Looking into the whole position a little more in detail we are all aware that those who know the country best admit that it is as good as ever for general farming purposes. The conditions of one part differ from those of others, but, taking it all round, it is safe to assert that the era of true development has scarcely as yet commenced. It is true that some of the natural pasturage has deteriorated through over-stocking and other recognised evils. But this is not beyond remedy, and now that the fact is being more generally recognised and those affected are seriously taking these matters in hand, we may look forward to the time when such land will be again turned to profit. The great problem of the country—or, rather, the greater part of it—is water. In the Western Province the rainfall is generally deemed sufficient and is fairly seasonable. But in other parts, where the rains are intermittent and are largely the result of torrential or semi-torrential downpours due to thunderstorms, the problem of the water supply is an ever-present trouble which calls for the greatest thought, the greatest energy and, frequently, a large outlay of capital. It is, therefore, apparent at a glance that the great need of a large proportion of agricultural South Africa is the study of the best means of conserving water in order to guard against the devastating effects of ever-recurring droughts. In conserving water for irrigation purposes and the utilisation of floods lies the great source of wealth for this country. There is some nervousness about large irrigation works, where great bodies of water could be impounded for use during the dry seasons. But this nervousness is gradually disappearing as individuals are succeeding in constructing very large works of their own, which are enabling them to increase their activities a thousand fold. And surely what can be accomplished by individuals should not be beyond the strength of the community. The works now cheerfully undertaken and successfully accomplished in this country by individual effort in the shape of water conservation would have staggered the imagination twenty years ago. And let us think just for one moment what a change would come over the whole face of this country were the favourable sites for such works all fully utilised. It would mean that our land would be dotted over with a series of lakes, whose valuable contents would be rendering the soil fertile and the people wealthy, instead of the

storm waters rushing away to the sea in their countless millions of gallons annually and carrying with them so large a proportion of some of the richest soil in the world.

The last few years have shown greater advances in this direction than any previous period in the history of this Colony, and it is largely due to this utilisation of conserved water, diverted flood waters and water from boreholes, that there has been such a marked falling off in the importation of articles capable of being produced here. Simultaneous with this, there has also been an increase in the extent of land brought under the plough in those districts where the rainfall is sufficient, so that between them the general agricultural output of the whole Colony has been very considerably increased. It has to be remembered that such works as those I am speaking of involve the outlay of large sums of money for capital expenditure, and it is into these works that a very large proportion of the money the farmers have been earning during that period has been sunk. Yet, in spite of all the individual effort, we have only touched the fringe of the great work which remains to be accomplished if we are ever to reap the full benefits of water conservation and the utilisation of flood waters. We are only, as it were, in the dawn-time of our ultimate wealth in irrigation. This Colony contains enormous tracts of land which can be cultivated for many years without a thought of fertiliser or manures of any description if we can only bring water to release their hidden riches. As a matter of fact, I know personally of such lands which have been worked for forty years and are as fertile to-day as when they were first cropped, and they have never received an ounce of manure during the whole of that period. Not that I have any desire to discourage the manuring and careful nursing of either irrigated lands or pasture; I merely mention this fact to prove that this country has enormous tracts of land second to none in the world for agricultural and pastoral purposes.

There is just one other point in this connection to which I should like to call attention. In the construction of irrigation works of all kinds the strictest economy is an urgent necessity. The high returns for much of the produce of irrigated lands which have ruled for some time past may not be always maintained. The Transvaal has been our best customer in the past, but the increasing agricultural activity in that portion of South Africa and the advancing output there of most of the products which the Cape has supplied show us very distinctly that the time may not be far distant when that community may be largely self-supporting. To what extent the Cape producer can compete with the Transvaaler in his own markets is still an open question, but it may be taken for granted that rail carriage will always be a heavy handicap for us. For this reason it would be wise for the agricultural population of this Colony to seriously consider the widening of its markets, either by the encouragement of a larger population here or the study of over-sea markets to which the surplus could be shipped.

In a few words, I believe that this Colony has little to fear but extravagance and a failure to realise the country's capabilities. Many of our people on the land manage to eke out a living of sorts too easily, and, unfortunately, they do not know it and blame the hardship of their lot. If they could recognise the dignity of labour they would do ever so much better. That is why I feel that the bitter experience of these depressed times, deplorable though they may be in their immediate effect, will contribute towards making better men and women of many of us. Great peoples are not evolved out of luxurious conditions; it is the hard country that, as a rule, produces the best types of the human race.

The crisis in the Viticultural industry of this Colony calls for something more than passing notice. The wine farmer has a great stake in the country, but he holds a peculiar position. The home of this industry is in the

West, and this fact, to some extent, accounts for the misconception which has arisen in a measure as to the extent of the actual difficulties with which he is faced. That these are real and of a threatening nature there can be no question. But it is not easy for those living in the Northern, Eastern and Midland sections, who have no knowledge of the case, to realise their full extent. I believe a feeling is growing that something should be done towards grappling with these difficulties, and that some attempt should be made to effectually settle them and help in some way towards placing this important industry on a surer footing. It is not for me here to go into details, but I would like to ask my brother farmers, who produce wine, to seriously consider if their undisturbed permanent financial prosperity lies entirely in the direction of supplying light wines for the consumption of the South African natives?

The fruit-growers have a great future before them, for they have not only the local markets open to them for their fresh and preserved products and jams, but they also have unlimited possibilities in the export trade. So far as I can judge, they only seem to need to study three things. The first of these is to grow and market only the most suitable and profitable varieties, and the second to exercise care in selection and packing for the oversea markets. The third is the practice of whole-hearted co-operation in preventing the spread of diseases and controlling insect pests. It is not too much to hope that this Congress will help materially in forwarding each of these projects

The whole Colony, and the cattle farmers in particular, feels the danger threatening from East Coast Fever, now raging in Natal, and I trust that anything this Congress may decide upon in connection therewith will tend to assist the authorities to so successfully guard our borders that this terrible disease may be prevented from crossing into Colonial territory. But the task is no easy one, though we may take some comfort from the success which attended the efforts of the Transvaal in keeping the disease in check, and in even going so far as to gradually suppress it. I will ask your indulgence while I state briefly the position in the Transvaal, kindly supplied to me by the Chief Veterinary Surgeon there, Mr. C. E. Gray. Mr. Gray writes:—"In the Transvaal, the first recorded outbreaks of East Coast Fever occurred in May, 1902, at Komati Poort and Nelspruit, both in the Barberton district. Thence the disease spread to Swaziland, the Kaap Valley and Lydenburg, extending afterwards by road, *via* Middelburg, to Pretoria. The infection in the Pretoria District was afterwards reinforced by the later introduction of a herd of infected cattle by rail from Barberton, and to the sale and distribution of this second herd the outbreak in the Rustenburg and Marico Districts must be attributed; while the northern part of the Middelburg District, the Zoutpansberg, and Waterberg Districts were probably infected by movements of cattle from Lydenburg, though there is reason to suspect that one or two centres in the north of the Zoutpansberg District originated in the movement of infected cattle from Rhodesia, belonging to certain Transvaal refugees, who eluded the Rhodesian Police stationed at the border to prevent the southward passing of their animals. A later and isolated outbreak at Germiston and Springs resulted from illicit movement of cattle sent from the infected area at Pietersburg to Johannesburg for slaughter. This brief review of the spread of the disease links up all the infected districts of the Transvaal, with the exception of Piet Retief, whence the disease spread from Swaziland. *Methods Adopted for Checking the Disease.*—After a careful and exhaustive study of this disease, the Department decided to adopt a policy for stamping it out, based upon an exact scientific knowledge of the methods by which it is spread. Briefly, this policy provides for the prevention or

careful control of movements of cattle in localities in or near which outbreaks of disease have occurred; of the quarantining of all infected areas, with the fencing of such areas whenever possible; and for the stamping out of isolated outbreaks by slaughter, with subsequent enclosure of the infected areas in which the animals have been running. This policy has been carried out with most satisfactory and encouraging results, and by adhering thereto we have succeeded in stamping out the disease entirely in the Pretoria, Wakkerstroom, Heidelberg, and Witwatersrand Districts, while its spread has been checked in the Piet Retief, Marico, and Rustenburg Districts. In the two last-mentioned Districts the number of infected farms has been reduced from 19 and 74 to 2 and 21 respectively; in the other districts which are still infected with the disease the return attached hereto shows the number of infected farms which have been taken out of quarantine in each district during the past three years. This return proves very conclusively that the policy which has been adopted has been a sound one, and though the clearing up of the infected areas takes time, good progress is being made, and we are gradually pushing the disease back. We have not yet got rid of the disease, as there are still infected centres in the districts of Piet Retief, Rustenburg, Waterberg, Middelburg, Lydenburg, and Zoutpansberg, also small centres in the Carolina, Marico, and Barberton districts, but we are making steady progress, and have every hope of ultimate success. I do not think that the policy we have adopted in this Colony can be greatly improved upon. The great safeguard is fencing, and every encouragement should be given to agriculturists to enclose their holdings, as experience has shown us that the man who keeps his cattle within an enclosed area can snap his fingers at this disease. The following is the number of farms taken out of quarantine during the last three years:—Heidelberg, 10; Piet Retief, 6; Witwatersrand, 17; Zoutpansberg, 157; Marico, 17; Barberton, 2; Pretoria, 49; Ermelo, 13; Middelburg, 28; Lydenburg, 4; Rustenburg, 41; Waterberg, 46; Wakkerstroom, 3; Total, 393."

This is what the Transvaal has accomplished and with their experience and that of Natal to guide us we can surely avoid anything like serious loss if the greatest vigilance is exercised.

The fall in the price of mohair is a very serious matter for the whole country as well as the farmers themselves. It will mean that a very considerable sum of money, running into hundreds of thousands of pounds, is lost to this Colony as compared with last year. In other words that large amount is withheld from circulation, for it all comes from over-sea. But there need be little alarm for the industry itself. We are quite capable of producing the class of hair that is required, but unfortunately, at present, there is an over-production of strong hair, and this has caused much of the trouble. The farmer who has bought or hired land on the assumption that mohair would maintain its price of a shilling a pound this year is the one who feels the pinch of the shoe mostly, seeing that he has to accept 8½d. or 9d. instead. The sudden drop in fair average ostrich feathers and the slump in the poorest qualities, though a bit of a set-back to many, is not altogether without its compensating advantages if it tends to the breeding of a better class of bird.

Wool has suffered in price, and it is a significant fact that Cape wools have been great sufferers in the world's markets. Had the majority of clips been more carefully got up, and less grease and dirt and more clean wool have been the objective of the breeders, the loss to the country would not have been so great. The skin market has suffered in sympathy with the other products, and here again the Cape skin and hide trade suffers because of so much faulty flaying and curing. I mention all these industries separately—and there are others which also suffer in the same way—because

when any wave of depression sweeps over the world's markets they feel it much more than they would if only the best possible was grown and offered in the cleanest, best sorted, and most attractive manner.

It is in the immeasurably great work of demonstrating how such things can be done and the advantage of doing them that this Union has one of its great fields for most profitable work. It is in this sphere where the farmer and townsman have but one object in view. Agricultural Societies, Farmers' Associations and kindred bodies should be the medium of such practical work as spreading valuable knowledge of this description and helpful advice. They would thus enable the country as a whole to increase its income by receiving more for its products which have to compete in the markets of the world, and in looking through the agenda for this Congress I am persuaded that your deliberations will tend in that direction.

There is yet another important phase of your work upon which I should like to say a few words. The close association of this Union with the other Colonies and States of South Africa, and the good fellowship which has arisen through your affiliation with the Inter-Colonial Agricultural Union, has always been a source of strength to this organisation, because thereby its scope for useful and profitable work has been considerably extended. However much we may deplore the financial depression, we can but rejoice at the growing spirit in favour of closer union throughout the sub-continent. I hope it is not going too far to say that so far as the farming element of the various States is concerned we have helped to show the way and spread that spirit. But the work is only now beginning in real earnest, and I feel confident that the Cape Agricultural Union will not in the least relax its efforts to bring about a wider spirit of co-operation and unity among all classes interested in agriculture in the Cape and throughout South Africa. This work can be carried out successfully for the profit of the whole country by none better than by such an organisation as ours in which all interested in agriculture—the townsman whose share is to promote its betterment by giving his money and time to an agricultural society, and the farmer struggling with his problems on the land—can meet for the promotion of interests vital to the whole community. In conclusion I feel it my duty to express my appreciation of the valuable services of your secretary, whose work has been of the greatest assistance to this Union during the past year.

THE UNDERGROUND WATERS OF CAPE COLONY—*(continued)*.

TABLE VIII. MIDDLE BEAUFORT BEDS.

No.	Division.	Locality.	Source.	Depth in ft.	Total Solids. 105°.	Total Solids. 180°.	Silica.	Alumina & Iron oxide.	Lime.	Magnesia	Chlorine.	Sulphuric oxide.	Carbon dioxide.	Remarks.
273	Colesberg	Naauwpoort	Borehole	261	33·0	32·2	1·72	...	6·24	...	3·85	3·27	7·67	
274	,,	,,	,,	262	32·2	31·4	2·16	...	7·28	...	2·80	2·43	9·06	North Road borehole; passes through purple shale and sandstone.
275	,,	,,	,,	262	26·88	...	2·06	·28	5·24	2·13	2·10	1·63	10·56	
276	,,	,,	,,	262	32·20	...	...	...	...	...	2·98	...	9·43	
277	,,	,,	,,	...	27·72	...	1·76	·20	4·92	1·87	2·20	1·86	7·64	
278	,,	,,	,,	75	29·75	29·75	1·60	·18	7·14	1·68	1·93	1·40	9·76	Borehole No. 4.
279	,,	,,	,,	381	42·00	...	...	...	...	...	3·85	...	10·60	West Road borehole, in indurated sandstone: water struck at 49 feet.
280	,,	Edendale ...	,,	50	35·00	...	...	...	...	...	2·63	...	9·59	From 3 boreholes in sandstone heading below dam: contains sodium carbonate.
281	,,	Heathwall	,,	...	25·40	...	...	...	...	...	2·80	...	6·84	From shallow boreholes in quartzite heading: contains sodium carbonate.
282	,,	Norval's Pont	,,	20½	25·0	24·2	...	...	...	...	1·4	...	...	
283	,,	Colesberg...	,,	400	66·36	56·84	2·78	·44	11·17	5·57	7·49	4·50	7·47	Two samples from borehole No. 1, Colesberg commonage, strata sandstone and shale.
284	,,	,,	,,	400	...	53·48	2·60	·24	11·40	6·35	7·14	4·22	7·47	
285	Hanover ...	Mealiefontein	,,	60½	27·44	24·92	2·22	·24	6·58	2·98	1·40	1·15	8·91	
286	,,	,,	,,	60½	28·20	25·48	2·28	·34	6·40	2·66	1·68	1·10	8·30	
287	,,	Dwaal ...	,,	...	29·96	...	...	...	...	...	1·96	...	...	
288	,,	,,	,,	...	...	29·68	2·54	·30	6·54	4·58	1·82	1·41	8·50	
289	,,	Hanover Road	Spring ...	...	28·28	...	...	...	...	...	1·82	...	8·69	Spring near Hanover Road Railway Station.
290	,,	Hanover ...	,,	...	37·4	35·8	...	...	...	...	2·92	...	...	
291	,,	Carolus Poort	,,	...	...	47·8	1·90	·32	2·70	5·56	4·59	3·07	8·78	
292	,,	,,	,,	...	39·76	37·20	...	...	...	...	5·65	...	...	
293	Victoria West	Biesjespoort	Borehole	61	...	38·40	2·16	·18	8·08	3·16	4·08	2·65	8·32	

TABLE VIII. MIDDLE BEAUFORT BEDS.—(*continued*).

No.	Division.	Locality.	Source.	Depth in ft.	Total Solids. 105°.	Total Solids. 180°.	Silica.	Alumina & Iron oxide.	Lime.	Magnesia.	Chlorine.	Sulphuric oxide.	Carbon dioxide.	Remarks.
294	Victoria West	Pampoen Poort	Borehole	...	...	43·60	3·00	·46	4·44	3·18	6·36	4·54	8·07	Borehole in blue shale, with beds of sandstone and quartzite; gas met at 60 feet; burning with pale blue flame.
295	,,	Loxton ...	,,	...	37·6	...	...	...	...	...	7·78	...	...	
296	,,	Victoria West	Spring ...	...	56·5	...	...	...	...	...	9·7	...	...	
297	,,	Hoek Plaats	,,	...	...	35·20	2·30	·48	8·13	4·35	1·41	1·04	11·40	
298	,,	Hutchinson	,,	...	39·2	37·6	...	...	...	...	3·82	...	...	
299	,,	,,	,,	...	...	42·6	1·86	·22	7·64	4·61	4·54	4·36	8·22	
300	Middelburg	The Willows	,,	...	63·63	...	...	...	...	...	4·70	...	...	
301	,,	,,	,,	...	64·33	...	...	...	...	...	4·21	...	...	
302	,,	Rosmead ...	,,	...	44·20	...	...	...	...	...	4·37	...	...	Taken from tap on railway station platform.
303	,,	Bultfontein	Borehole	...	37·24	...	2·69	Nil	7·06	3·72	3·34	1·81	10·22	
304	,,	,,	,,	...	...	41·72	2·60	·22	6·72	4·28	3·22	6·46	9·99	
305	Graaff-Reinet	Bethesda Road	,,	300	24·92	23·52	·86	·14	2·50	·22	2·24	3·26	4·16	Borehole passes through shale and sandstone.
306	Cradock ...	Mortimer ...	,,	137	21·6	21·0	1·36	·18	·50	·13	5·6	·16	2·94	
307	,,	,,	,,	460	22·6	22·0	1·66	·20	·34	·08	6·3	·32	3·02	
308	,,	Tarka Bridge	,,	...	...	38·80	1·76	·06	3·82	1·23	13·79	·33	5·33	Potassium present, also minute amount of Lithium.
309	,,	Driefontein	,,	115	17·3	...	1·98	·26	1·80	·83	2·48	1·16	3·08	
310	,,	,,	,,	...	...	37·20	...	...	...	...	16·69	...	...	
311	,,	,,	Spring ...	...	...	35·9	2·68	·34	5·02	3·44	3·92	1·97	9·02	Spring in small dam.
312	,,	,,	,,	...	...	41·8	2·56	·56	4·98	3·55	6·74	3·16	8·47	
313	,,	,,	,,	...	40·2	39·2	2·18	·26	5·20	3·46	5·65	2·15	9·98	185½ miles north of Port Elizabeth, 1 mile west of railway.
314	,,	,,	,,	...	58·5	55·8	2·98	·18	6·40	5·75	8·49	4·16	12·41	185½ miles north of Port Elizabeth, 400 yards east of railway.
315	,,	,,	,,	...	52·5	51·8	·80	...	6·70	...	3·22	4·62	13·17	
316	,,	,,	,,	...	54·32	53·48	·68	...	6·42	...	3·22	4·47	8·53	
317	,,	,,	,,	...	63·84	63·28	2·14	...	7·12	...	3·36	4·57	11·36	

TABLE VIII. MIDDLE BEAUFORT BEDS.—(*continued*).

No.	Division.	Locality.	Source.	Depth in ft.	Total Solids.		Silica.	Alumina & Iron oxide.	Lime.	Magnesia.	Chlorine.	Sulphuric oxide.	Carbon dioxide.	Remarks.
					105°.	180°.								
318	Cradock ...	Driefontein	Spring ...	...	...	47·32	3·19	·18	6·51	5·29	5·15	3·19	12·26	Spring 50 yards from source in Wilgebooms River, 5 miles north of Cradock.
319	"	"	"	...	...	48·72	2·90	·20	6·77	5·23	5·15	3·23	12·20	Spring 10 yards from source in Wilgebooms River, 5 miles north of Cradock.
320	"	Cradock ...	Borehole	50—90	13·0	...	...	...	...	...	2·00	...	..	Sulphur spring.
321	"	"	"	50—90	12·2	...	...	...	...	...	1·65	...	...	" "
322	"	Holts Huis Baaken	Spring ...	...	40·8	...	...	...	...	...	3·15	...	...	Natural spring 12 miles from Cradock source of town supply.
323	Cathcart ...	Surbiton Halt	Borehole	123	...	47·2	1·69	·17	8·19	3·51	15·65	·25	9·36	
324	Komgha ...	Komgha ...	Spring ...	...	...	31·80	3·54	·20	3·64	2·43	8·14	·18	4·96	

TABLE IX. BURGHERSDORP (UPPER BEAUFORT) BEDS.

No.	Division.	Locality.	Source.	Depth in ft.	Total Solids. 105°.	Total Solids. 180°.	Silica.	Alumina & Iron oxide.	Lime.	Magnesia.	Chlorine.	Sulphuric oxide.	Carbon dioxide.	Remarks.
325	Aliwal North	Aliwal North	Spring ...	...	...	37·8	1·30	·30	8·30	5·66	·55	1·76	14·17	
326	"	"	"	...	...	21·4	1·58	·42	4·26	2·17	·71	·34	6·47	
327	"	"	"	...	85·12	...	...	...	...	...	47·64	...	...	
328	Albert ...	Burghersdorp	Borehole	75	48·16	...	·92	·26	2·52	·78	7·70	5·15	12·94	
329	"	"	Spring ...	...	26·04	...	...	...	...	...	1·40	...	11·11	Spring near Henning Siding.
330	Steynsburg	Kalkoen Kraans	"	...	31·30	30·5	2·16	·28	4·52	3·82	1·65	1·89	...	
331	"	Henning ...	"	...	34·5	...	2·28	·42	10·64	2·71	2·01	2·74	...	
332	"	Steynsburg	Borehole	...	...	70·2	3·88	·20	5·50	11·14	8·84	6·08	15·08	
333	Queenstown	Carl's Rust	"	86	28·8	25·6	1·82	·22	6·24	2·59	2·83	·92	8·47	
334	"	Imvani ...	"	303	45·92	...	1·92	·42	8·74	1·38	11·55	1·58	11·03	
335	"	"	"	...	...	45·0	1·26	·34	6·30	1·19	11·32	...	...	
336	"	Sterkstroom	Spring ...	...	...	74·8	...	...	...	...	12·5	...	...	
337	"	"	Borehole	80	...	74·8	1·82	·19	5·51	6·58	12·5	9·54	15·12	
338	"	Bowker's Kop	"	182	...	...	...	...	11·4	7·5	12·03	Trace	11·42	
339	Glen Grey	Lady Frere	Spring ...	...	15·4	...	...	...	...	...	·99	...	...	

TABLE X. STORMBERG SERIES.

No.	Division.	Locality.	Source.	Depth in ft.	Total Solids. 105°.	Total Solids. 180°.	Silica.	Alumina & Iron oxide.	Lime.	Magnesia.	Chlorine.	Sulphuric oxide.	Carbon dioxide.	Remarks.
340	Molteno ...	Stormberg	Borehole	506	20·72	20·6	1·22	·18	3·18	1·69	1·05	·34	7·52	
341	"	Paarde Kraal	"	...	...	20·6	1·34	·20	3·46	2·09	1·75	·80	6·84	Borehole No. 2.
342	"	"	"	...	...	21·6	1·18	·28	3·94	2·54	1·75	·79	7·64	Borehole No. 1.
343	Wodehouse	Indwe ...	"	...	51·6	50·6	...	...	...	...	7·0	...	...	
344	"	" (Koornhoek)	Spring ...	...	10·0	...	...	...	...	...	·51	...	...	
345	"	Halseton ...	"	...	...	18·4	2·28	·38	3·30	1·91	·64	·50	4·77	Larger spring, Carnarvon Farm.
346	"	"	"	...	...	15·4	1·36	·26	3·08	1·87	·49	·46	4·16	Lesser spring, " "
347	"	"	"	...	12·5	...	...	...	...	...	·51	...	...	" " " "
348	"	"	"	...	13·3	...	...	...	...	...	·61	...	...	Larger spring, " "
349	"	"	"	...	...	16·4	1·74	·24	2·74	1·69	·57	·57	4·74	Dam at Carnarvon Farm, fed by springs.
350	"	"	"	...	13·0	...	...	...	...	...	·53	...	...	" " " "
351	"	"	"	...	13·6	...	...	...	...	...	·58	...	...	" " " "
352	"	Dordrecht	"	...	14·14	...	...	...	...	...	·84	...	...	Parsonage spring.
353	"	"	"	...	23·80	...	...	...	...	...	·70	...	...	Kloof spring.
354	"	"	"	...	23·80	...	...	...	...	...	·99	...	...	Reservoir spring.
355	Aliwal North	Lady Grey	"	...	...	29·4	1·86	·32	6·60	2·49	1·77	1·04	7·85	
356	"	"	"	...	13·4	...	...	...	...	...	...	...	...	
357	"	"	"	...	...	18·4	1·28	·40	4·34	1·55	·42	·20	4·97	
358	Barkly East	Rhodes ...	"	...	10·4	...	...	...	...	...	·7	...	...	
359	"	Barkly East	Borehole	...	25·4	...	...	...	...	...	1·75	...	...	
360	Elliot—Slang River	Elliot ...	"	200	24·6	...	...	...	...	...	2·30	...	...	

TABLE XI. UITENHAGE SERIES.

No.	Division.	Locality.	Source.	Depth in ft.	Total Solids. 105°.	Total Solids. 180°.	Silica.	Alumina & Iron oxide.	Lime.	Magnesia.	Chlorine.	Sulphuric oxide.	Carbon dioxide.	Remarks.
361	Mossel Bay	Mossel Bay	Spring ...	...	...	531·80	1·82	·20	16·38	25·01	224·25	47·79	23·13	
362	Oudtshoorn	Welbedacht	Borehole	...	250·6	240·8	2·52	·74	16·38	4·87	119·00	9·67	4·76	E. A. Edmeades' farm, 13 miles west of Oudtshoorn.
363	Uitenhage	Glenconnor	"	...	...	811·6	...	...	48·60	56·6	415·6	68·20	7·79	
364	"	"	"	...	...	859·0	...	...	50·40	71·0	412·2	68·30	6·75	
365	"	"	"	461	...	1106·5	2·12	Trace	76·22	65·83	473·2	91·57	7·98	
366	"	"	"	...	...	355·0	...	...	...	...	241·6	...	6·07	Borehole at Schildpad Dop.
367	"	" (Highlands)	"	266	13·00	12·20	·68	·12	·60	·81	4·50	·80	1·66	Borehole said to be in soft sandstone.
368	"	Sandfontein	Spring ...	...	...	12·00	·78	·32	·60	1·08	5·31	·72	·31	Spring above Sandfontein homestead.
369	"	Stembok Vlakte	Borehole	...	162·96	...	1·31	·66	2·52	4·57	54·60	17·89	29·63	
370	"	"	"	...	172·20	...	1·20	1·12	3·14	5·11	54·60	17·51	29·88	
371	Alexandria	Niekerk's Hope	Spring ...	...	...	98·4	1·92	·32	13·08	4·37	42·44	5·35	8·65	Spring in forest farm; yields 5,000 gallons per diem.
372	"	"	"	...	107·7	...	...	...	...	...	42·42	...	...	
373	"	"	"	...	121·4	...	...	...	...	...	44·38	...	...	
374	"	Sandflats	Borehole	...	...	119·2	1·04	·18	4·36	2·00	53·76	9·17	5·48	
375	"	Mimosa ...	"	...	...	164·0	2·38	·34	10·32	11·07	74·90	8·48	8·99	
376	"	Addo ...	Spring ...	...	...	2225·86	...	...	...	...	...	...	...	

TABLE XII. NORTHERN DISTRICTS.

No.	Division.	Locality.	Source.	Depth in ft.	Total Solids. 105°.	Total Solids. 180°.	Silica.	Alumina & Iron oxide.	Lime.	Magnesia.	Chlorine.	Sulphuric oxide.	Carbon dioxide.	Remarks.
377	Kenhardt...	Driekop ...	Spring ...	...	27·4	...	...	...	...	...	4·5	...	...	
378	"	"	"	...	46·76	...	...	...	...	...	9·44	...	...	
379	"	"	"	...	49·0	...	...	...	...	...	9·9	...	...	
380	"	Cypher Spring	"	...	55·16	...	...	...	...	...	12·17	...	...	
381	Kuruman	Soedin ...	"	...	23·4	...	...	...	...	...	·53	...	...	
382	Hay ...	Griquatown	"	...	37·8	...	...	...	...	...	2·03	...	...	Eye of spring at Griquatown Gaol.
383	"	"	"	...	39·2	...	...	...	...	...	2·07	...	...	" " " " (after flowing in furrow).
384	Vryburg ...	Geluk ...	Natural Well	105	23·2	...	1·72	·40	7·14	4·16	1·28	...	...	Natural well at Wondergat.
385	"	"	"	105	21·6	...	1·2	·3	4·7	4·1	·9	·4	...	" "
386	"	Vryburg ...	Spring ...	...	28·0	...	...	...	...	...	1·54	...	...	Spring near Gaol.
387	"	Zwartfontein	"	...	16·45	...	...	...	...	...	1·54	...	...	
388	"	"	"	...	40·8	...	...	...	...	...	2·83	...	...	
389	"	"	"	...	42·8	...	...	...	...	...	2·83	...	...	
390	"	Raath's Dam	"	...	6·10	...	...	...	...	...	1·54	...	...	
391	Mafeking...	Mafeking...	"	...	33·95	...	...	...	...	...	2·95	...	·77	Spring 3½ miles N.E. of Mafeking: rises through thick limestone bed.
392	"	"	"	...	41·0	...	·37	1·8	5·3	5·6	2·6	·4	...	Waterworks Co.'s springs, flowing in open trenches to reservoir.

TABLE XIII.

No.	Locality and Source.	Calcium. Carbonate.	Calcium. Sulphate.	Calcium. Chloride.	Magnesium. Carbonate.	Magnesium. Sulphate.	Magnesium. Chloride.	Sodium. Carbonate.	Sodium. Sulphate.	Sodium. Chloride.	Total incrusting solids.	Comparison number.	*Rating.
	TABLE I.—TABLE MOUNTAIN SERIES.												
9	Cape Town Docks, supply pipe	·43	...	...	·06	·54	·26	...	...	3·46	1·29	1	Very good.
10	" " "	·43	...	...	·06	·48	·26	...	...	3·76	1·23	1	"
12	Sea Point mains	·34	·19	...	...	·26	·31	...	...	2·42	1·10	1	"
14	Newlands spring	Trace	·27	·28	...	...	·64	...	...	1·60	·91	1	"
19	Retreat stream	·21	·53	...	...	·54	·71	...	...	6·74	1·99	2	"
26	Bot River Flats stream	·49	·12	...	...	·26	1·00	...	...	9·18	1·87	2	"
41	Brandvlei, Worcester	1·50	1·17	...	...	·29	...	...	...	1·60	2·96	3	"
42	" "	·91	...	...	·53	.09	...	...	·41	1·91	1·53	1	"
51	Barrydale spring	2·80	...	...	·69	...	...	·67	·69	3·79	3·49	3	"
62	Warmbad spring	2·05	...	...	·40	·72	...	...	·11	3·79	3·17	3	"
63	Toorwater Poort spring	·35	·43	·08	...	...	·81	...	...	3·59	1·59	1	"
64	" "	·35	·15	...	...	·33	·59	...	...	3·43	1·42	1	"
65	" "	·35	·19	...	...	·45	·64	...	...	2·90	1·63	2	"
66	" "	·35	·34	...	...	·39	·83	...	...	3·13	1·91	2	"
67	" "	·82	...	...	·02	1·19	·48	...	...	4·48	2.51	2	"
69	Uitenhage spring	·28	1·17	...	...	...	·95	...	...	3·28	2·40	2	"
	TABLE II.—MALMESBURY SERIES.												
75	Railway Steamshed borehole	2·80	1·31	...	...	4·64	6·29	...	...	36·71	15·04	14	Good.
77	" " "	2·50	...	...	·96	5·64	2·73	...	...	39·58	11·83	10	"
78	" " "	3·34	...	...	·96	5·67	4·04	...	...	34·74	14·01	13	"
79	J. J. Hill & Co.'s borehole	3·80	·68	...	...	4·61	10·90	...	...	45·73	19·99	18	Fair.
84	Sea Point spring	2·18	...	...	1·57	1·83	·10	...	...	20·29	5·68	5	Very good.
85	" "	2·86	...	...	1·18	2·07	1·31	...	...	24·03	7·42	7	"
94	Newlands borehole	·61	...	...	2·02	trace	·64	...	...	6·64	3·27	3	"
103	Uitvlugt borehole	12·71	...	...	1·93	7·94	36·17	...	...	240·21	58·75	53	Very bad.
121	Fairfield spring	12·98	...	...	5·04	5·36	11·45	...	...	84·82	34·83	32	Poor.
122	Bellville borehole	5·39	·63	2·62	...	...	10·59	...	...	25·00	16·61	15	Good.
127	Klipfontein spring	...	2·70	...	1·05	1·05	4·09	...	...	29·48	7·84	7	Very good.

*For Engine purposes.

TABLE XIII—(*continued*).

No.	Locality and Source.	Calcium.			Magnesium.			Sodium.			Total incrust-ing solids.	Comparison number.	Rating.
		Carbo-nate.	Sul-phate.	Chlo-ride.	Carbo-nate.	Sul-phate.	Chloride.	Carbo-nate.	Sul-phate.	Chloride.			
	TABLE II.—MALMESBURY SERIES.—(*continued*).												
128	Klipfontein spring	...	2·84	...	·54	·54	4·42	...	...	27·90	7·80	7	Very good.
129	Kalabas Kraal borehole	2·61	...	...	5·82	...	...	2·75	9·00	81·90	8·43	8	„
130	„ „	9·50	...	...	9·35	15·41	·95	...	...	174·85	35·21	32	Poor.
131	Moorreesburg borehole	11·75	...	...	5·36	4·08	...	...	9·12	100·97	21·19	19	Fair.
132	Witteklip spring	6·73	6·55	3·19	...	...	20·76	...	...	87·65	34·04	31	Poor.
133	„ „	6·59	7·41	...	...	11·34	5·08	...	...	61·35	30·42	28	„
134	Uilen Kraal spring	13·27	...	...	2·69	3·05	1·07	...	...	39·57	20·08	18	Fair.
	TABLE III.—BOKKEVELD SERIES.												
139	Willowmore borehole	34·30	12·42	...	...	37·92	5·01	...	...	121·28	89·65	81	Very bad.
140	„ „	23·21	...	...	7.85	30·27	...	...	16·93	101·23	61·33	56	„
145	Landdrosts Plaats well	37·66	7·50	...	...	32·90	10·26	...	...	99·25	88·32	80	„
147	Antonie spring	15·21	...	...	12·28	5·64	...	...	8·66	42·68	33·13	30	Poor.
149	Caledon borehole	7·75	...	...	4·96	11·87	11·35	...	...	117·15	35·93	33	„
	TABLE IV.—WITTEBERG SERIES.												
154	Alicedale borehole	3·00	...	...	1·85	...	...	8·67	4·44	25·49	4·85	4	Very good.
155	„ „	3·75	...	...	3·15	...	...	10·58	4·49	25·44	6·90	6	„
157	„ „	4·70	...	...	1·70	...	...	9·18	4·10	31·61	6·40	6	„
158	„ „	6·79	...	...	6·26	...	...	4·70	8·61	49·60	13·05	12	Good.
161	Constable borehole	7·50	4·37	...	...	·23	31·28	...	...	54·73	43·38	39	Bad.
162	Tweedside borehole	15·50	...	...	2·54	2·46	3·25	...	...	20·48	23·75	22	Fair.
164	„ „	16·46	...	...	·53	1·25	1·72	...	...	18·59	23·96	22	„
	TABLE V.—DWYKA SERIES.												
166	Isinuka spring	64·64	...	...	32·70	...	...	281·07	754·57	1119·09	97·34	88	Very bad.
167	„ „	70·04	...	...	32·34	...	...	367·99	775·48	1195·44	102·38	93	„

TABLE XIII—(*continued*).

No.	Locality and Source.	Calcium.			Magnesium.			Sodium.			Total incrusting solids.	Comparison number.	Rating.
		Carbonate.	Sulphate.	Chloride.	Carbonate.	Sulphate.	Chloride.	Carbonate.	Sulphate.	Chloride.			
	TABLE V.—DWYKA SERIES.—(*continued*).												
168	**Isinuka spring**	70·57	...	...	29·25	...	...	352·79	755·97	1117·91	99·82	90	Very bad.
177	**Beaconsfield borehole**	15·95	6·82	...	...	4·01	4·92	...	...	79·97	31·73	29	Poor.
178	**Miller borehole**	19·20	...	...	5·01	9·98	·40	...	...	56·60	31·62	31	,,
179	**Fullarton borehole**	21·50	24·33	...	...	20·88	1·69	...	...	136·11	68·40	62	Very bad.
180	**Matjesfontein borehole**	11·64	...	...	5·62	1·80	...	...	5·31	23·61	19·06	17	Fair.
184	**Vryburg borehole**	7·54	...	...	21·42	21·00	...	...	6·75	23·89	49·96	45	Very bad.
	TABLE VI.—ECCA SERIES.												
188	**Paarde Vlei borehole**	16·64	...	...	4·78	12·78	...	...	·46	18·08	34·20	31	Poor.
191	**De A r borehole**	·71	...	...	·25	...	...	7·61	·20	4·61	·96	1	Very good.
192	**,, ,,**	13·71	...	...	8·40	...	...	·75	2·80	4·91	22·11	20	Fair.
193	**De Poort borehole**	11·79	...	...	6·38	2·33	·86	...	...	2·18	21·36	19	,,
194	**Oatlands spring**	21·07	...	...	10·39	4·65	...	...	7·93	41·38	36·11	33	Poor.
195	**Klipplaat borehole**	23·32	...	...	5·70	9·84	...	...	4·44	50·18	38·86	35	Bad.
198	**Middleton borehole**	25·71	...	...	16·23	...	...	1·96	5·57	29·65	41·91	38	,,
199	**Ripon borehole**	4·14	...	...	15·52	...	...	1·71	16·26	37·84	19·66	18	Fair.
200	**,, ,,**	15·79	...	...	10·63	6·42	1·07	...	...	39·75	33·91	31	Poor.
201	**,, ,,**	30·07	...	...	3·79	17·99	14·68	...	...	103·73	66·53	60	Very bad.
202	**Driefontein borehole**	16·07	...	...	16·44	...	...	5·25	8·54	19·89	32·51	30	Poor.
203	**Fort Jackson borehole**	11·96	...	...	8·19	...	...	1·86	3·64	10·84	20·15	18	Fair.
204	**Umzimkulu spring**	4·43	...	...	1·72	...	...	2·21	·57	Trace	6·15	6	Very good.
	TABLE VII.—LOWER BEAUFORT BEDS.												
205	**Kaffir Kraal borehole**	22·91	·36	...	...	13·23	11·64	...	...	8·98	58·14	53	Very bad.
206	**,, ,,**	23·61	2·67	...	...	13·40	11·16	...	...	9·58	50·84	46	,,
207	**Beyersburg borehole**	17·25	...	...	4·33	11·64	6·01	...	...	11·83	39·23	36	Bad.

TABLE XIII—(*continued*).

No.	Locality and Source.	Calcium. Carbonate.	Calcium. Sulphate.	Calcium. Chloride.	Magnesium. Carbonate.	Magnesium. Sulphate.	Magnesium. Chloride.	Sodium. Carbonate.	Sodium. Sulphate.	Sodium. Chloride.	Total incrusting solids.	Comparison number.	Rating.
	TABLE VII.—LOWER BEAUFORT BEDS.—(*continued*).												
208	Carnarvon borehole	11·82	...	...	6·51	...	...	1·88	4·03	4·78	18·33	17	Fair.
211	Noblesfontein borehole	1·75	92·33	...	...	·39	...	...	59·69	9·36	94·47	86	Very bad.
212	" "	6·95	51·50	...	...	6·78	...	...	34·72	6·75	68·23	62	"
215	" "	2·52	92·75	...	...	1·74	...	...	17·15	9·31	97·01	88	"
216	" "	1·41	94·03	...	...	Trace	...	...	59·99	15·26	95·44	87	"
217	Rhenosterkop borehole	21·34	·90	...	...	11·81	3·70	...	...	16·45	37·75	34	Bad.
218	Beaufort West borehole	15·14	...	...	2·08	5·49	...	...	4·63	8·49	22·71	20	Fair.
219	" "	12·50	...	...	6·98	...	...	1·69	11·76	5·77	19·48	18	"
222	" "	15·61	...	...	3·04	3·39	..	...	8·72	7·58	22·04	20	"
223	" "	16·25	...	...	2·50	7·92	...	...	2·52	6·92	26·67	24	Poor.
224	" spring	20·09	6·53	..	...	8·51	...	...	22·42	40·22	35·23	32	"
226	Prince Albert Road borehole	18·23	...	...	·10	5·04	...	...	6·21	17·43	23·37	21	Fair.
233	Aberdeen Road borehole	20·46	...	...	3·36	8·76	1·21	...	...	25·03	33·79	31	Poor.
234	Marais borehole	21·07	8·40	...	...	2·24	11·54	...	...	19·07	43·25	39	Bad.
235	Charlwood borehole	·80	...	...	·38	...	...	20·86	2·29	6·92	1·18	1	Very good.
236	" "	·09	...	...	·21	...	...	9·59	1·54	7·00	·31	½	"
237	Kendrew borehole	20·80	3·88	19·54	...	...	12·85	...	...	17·55	37·53	34	Poor.
238	" "	25·05	5·90	...	...	3·54	13·25	...	...	21·44	47·74	43	Bad.
239	Graaff-Reinet borehole	22·25	2·33	...	...	6·18	3·92	...	...	27·47	73·27	67	Very bad.
240	" "	9·09	26·86	16·11	...	...	21·21	...	...	21·59	57·16	52	"
241	" "	21·14	23·05	1·53	...	...	19·64	...	...	31·29	63·83	58	"
242	" spring	20·73	2·74	...	...	13·83	4·47	...	...	17·90	41·77	38	Bad.
244	Rynheath spring	5·04	...	...	Trace	...	...	3·85	4·26	7·00	5·04	5	Very good.
245	Richmond Road borehole	22·55	30·82	...	...	34·26	...	...	12·35	93·85	87·63	80	Very bad.
246	Deelfontein borehole	5·25	...	...	1·43	...	...	6·36	3·48	2·92	6·68	6	Very Good.
247	Blaauwbank borehole	9·43	...	...	4·31	...	...	2·82	3·71	3·79	13·74	12	Good.
252	Riet borehole	15·82	...	...	5·88	4·77	...	...	·64	9·81	26·47	24	Poor.
253	Bletterman borehole	8·50	...	...	7·67	...	...	·67	3·76	6·05	16·17	15	Good.
254	Witmoss borehole	16·00	...	...	13·50	6·69	...	...	1·69	21·04	36·19	33	Poor.

TABLE XIII—(*continued*).

No.	Locality and Source.	Calcium.			Magnesium.			Sodium.			Total incrusting solids.	Comparison number.	Rating.
		Carbonate.	Sulphate.	Chloride.	Carbonate.	Sulphate.	Chloride.	Carbonate.	Sulphate.	Chloride.			
	Table VII.—Lower Beaufort Beds.—(*continued*).												
255	Bedford borehole	23·00	...	...	7·14	10·26	10·83	...	...	22·43	51·23	46	Very bad.
259	Fort Beaufort spring	1·89	...	...	·50	...	...	·51	1·65	23·40	2·39	2	Very good.
261	Beage spring	1·11	...	...	·11	·39	·19	...	...	2·11	1·80	1	"
262	Amabele spring	1·43	...	...	·90	...	...	·99	·60	4·09	2·33	2	"
263	Breidbach borehole	15·34	6·14	9·16	...	...	30·90	...	...	83·22	52·38	48	Very bad.
264	The Halt borehole	17·64	10·78	...	...	4·59	9·95	...	...	95·30	42·96	39	Bad.
265	Blaney borehole	8·75	...	...	2·65	·40	...	...	·27	9·39	12·30	11	Good.
267	East London spring	5·05	7·36	...	...	12·12	9·88	...	...	44·38	34·41	31	Poor.
268	" borehole	9·59	1·63	...	...	9·08	13·59	...	...	80·75	33·89	31	"
269	" "	13·02	2·02	...	...	2·90	14·27	...	...	47·87	32·21	29	"
271	" "	11·07	25·55	...	...	·30	28·74	...	...	134·74	65·66	60	Very bad.
272	Chiselhurst borehole	24·11	...	...	3·97	7·95	22·87	...	...	101·31	58·90	54	"
	Table VIII.—Middle Beaufort Beds.												
273	Naauwpoort borehole	11·14	...	...	4·70	...	...	·75	5·80	6·34	15·84	14	Good.
274	" "	13·00	...	...	6·07	...	...	·37	4·31	4·61	19·07	17	Fair.
275	" "	9·36	...	...	4·47	...	...	9·88	2·89	3·46	13·83	13	Good.
277	" "	8·79	...	...	3·93	...	...	4·12	3·30	3·63	12·72	12	"
278	" "	12·75	...	...	3·53	...	...	5·54	2·49	3·18	16·28	15	"
285	Mealiefontein borehole	11·75	...	...	6.26	...	...	·79	2·04	2·31	18·01	16	"
286	" "	11·43	...	...	5·59	...	...	·82	1·95	2·77	17·02	15	"
287	Dwaal borehole	11·68	...	...	6·42	2·12	1·92	...	...	·62	22·14	20	Fair.
291	Carolus Poort spring	4·82	...	...	11·68	...	...	1·30	5·45	7·56	16·50	15	Good.
293	Biesjespoort borehole	14·43	...	...	3·76	3·98	·09	...	...	6·61	22·26	20	Fair.
294	Pampoen Poort borehole	7·93	...	...	6·68	...	...	2·36	8·06	10·48	14·61	13	Good.
297	Hoek Plaats spring	14·52	...	...	9·14	...	...	·53	1·85	2·32	23·66	21	Fair.
299	Hutchinson spring	13·64	...	...	4·24	6·54	·97	...	...	6·28	25·39	23	Poor.

TABLE —(ued).

No.	Locality and Source.	Calcium.			Magnesium.			Sodium.			Total incrusting solids.	Comparison number.	Rating.
		Carbonate.	Sulphate.	Chloride.	Carbonate.	Sulphate.	Chloride.	Carbonate.	Sulphate.	Chloride.			
	TABLE VIII.—MIDDLE BEAUFORT BEDS.—(*continued*).												
303	Bultfontein borehole	12·61	...	...	7·81	...	...	1·40	3·21	5·50	20·42	19	Fair.
304	" "	12·00	...	...	8·99	...	...	...	11·47	5·31	20·99	19	"
305	Bethesda Road borehole	4·46	...	...	·46	...	..	4·73	5.79	3·69	4·92	4	Very good.
306	Mortimer borehole	·89	...	...	·27	...	...	5·57	·28	9·23	1·16	1	"
307	" "	·61	...	...	·17	...	...	6·41	·57	10·38	·78	1	"
308	Tarka Bridge borehole	6·82	...	...	2·58	...	...	2·36	·59	22·72	9·40	9	"
309	Driefontein borehole	3·22	...	...	1·74	...	...	1·81	2·06	4·09	4·96	4	"
313	" spring	9·29	...	...	7·27	...	...	5·01	3·82	9·31	16·56	15	Good.
314	" "	11·43	...	...	12·08	...	...	2·53	7·38	13·99	23·51	21	Fair.
315	" "	11·96	...	...	11·13	...	...	5·01	8·20	5·31	23·09	21	"
316	" "	11·46	...	...	8·13	...	...	5·37	7·93	5·31	19·59	18	"
317	" "	12·71	...	...	6·85	...	...	5·01	8·11	5·54	19·56	18	"
318	" "	11·63	...	...	11·11	...	...	3·18	5·66	8·49	22·74	21	"
319	" "	12·09	...	...	10·98	...	...	2·72	5·73	8·49	23·07	21	"
323	Surbiton borehole	14·63	...	...	5·58	·38	1·71	...	...	22·69	22·30	20	"
324	Komgha spring	6·50	...	...	4·01	·27	1·02	...	...	12·16	11·80	11	Good.
	TABLE IX.—BURGHERSDORP (UPPER BEAUFORT) BEDS.												
325	Aliwal North spring	14·82	...	...	11·89	...	...	3·42	3·12	·91	26·71	24	Poor.
326	" "	7·61	...	...	4·56	...	...	1·76	·60	1·17	12·17	11	Good.
328	Burghersdorp borehole	4·50	...	...	1·64	...	...	24·33	9·14	12·69	6·14	6	Very good.
330	Kalkoen Kraans spring	8·07	...	...	8·02	...	...	8·10	3·36	2·72	16·09	15	Good.
332	Steynsburg borehole	9·82	...	...	20 54	2·04	...	...	9·59	14·57	32·40	29	Poor.
333	Carl's Rust borehole	11·14	...	...	5·44	...	...	1·74	1·63	4·66	16·58	15	Good.
334	Imvani borehole	15·61	...	...	2·90	...	...	6·36	2·80	19·03	18·51	17	"
337	Sterkstroom borehole	9·84	...	...	13·82	...	...	8·55	16·93	20·60	23·66	21	Fair.
338	Bowker's Kop borehole	20·3	...	...	5·0	Trace	11·2	...	...	6·03	36·5	33	Poor.

TABLE XIII—(*continued*).

No.	Locality and Source.	Calcium. Carbonate.	Calcium. Sulphate.	Calcium. Chloride.	Magnesium. Carbonate.	Magnesium. Sulphate.	Magnesium. Chloride.	Sodium. Carbonate.	Sodium. Sulphate.	Sodium. Chloride.	Total incrusting solids.	Comparison Number.	Rating.
	TABLE X.—STORMBERG SERIES.												
340	Stormberg borehole	5·68	...	...	3·55	...	...	7·61	·60	1·73	9·23	8	Very good.
341	Paarde Kraal borehole	6·18	...	...	4·39	...	...	4·38	1·42	2·88	10·57	10	Good.
342	" "	7·04	...	...	5·33	...	...	4·22	1·40	2·88	12·37	11	"
345	Halseton spring	5·89	...	...	4·01	...	...	·19	·89	1·06	9·90	9	Very good.
346	" "	5·50	...	...	3·32	·69	·14	...	...	·63	9·65	9	"
349	" "	4·89	...	...	3·55	...	...	1·76	1·01	·94	8·44	8	"
355	Lady Grey spring	11·79	...	...	5·08	·21	...	...	1·60	2·92	17·08	15	Good.
357	" "	7·75	...	...	2·98	·30	·07	...	...	·61	11·10	10	"
	TABLE XI.—UITENHAGE SERIES.												
361	Mossel Bay spring	29·25	...	...	19·59	47·04	...	...	29·16	369.54	95·88	87	Very bad.
362	Welbedacht borehole	10·82	16·44	7·04	...	...	11·57	...	...	174·45	38·83	35	Bad.
363	Glenconnor borehole	17·70	93·96	...	...	19·40	119·06	...	...	538·23	250·12	227	Very bad.
364	" "	15·34	101·54	...	...	12·86	158·44	...	...	533·57	288·18	262	"
365	" "	18·14	155·67	3·88	...	...	156·35	...	...	583·12	330.16	300	"
367	Highlands borehole	1·07	...	...	1·70	...	...	·72	1·42	7·42	2·77	3	Very good.
368	Sandfontein spring	·70	·51	...		·63	2·07	...	...	6·21	3·91	4	"
369	Stembok Vlakte borehole	4·50	...	...	9·60	...	...	51·49	31·75	89·97	14·10	13	Good.
370	" "	5·61	...	...	10·73	...	...	52·49	31·08	89·97	16·34	15	"
371	Niekerk's Hope spring	19·66	5·03	...	...	3·59	7·53	...	...	60·66	35·81	33	Poor.
374	Sandflats borehole	7·79	...	...	3·91	·42	...	...	15·78	88·59	12·12	11	Good.
375	Mimosa borehole	18·43	1·68	...	...	12·72	14·32	...	...	105·79	47·15	43	Bad.

FODDERS AND THEIR NUTRIENT VALUES.

By Dr. C. F. JURITZ, Senior Government Analyst.

A specimen of "Vlei grass" from the vicinity of Mulder's Vlei was recently analysed in the Government Analytical Laboratory, with a view to comparison with ordinary dried fodder. The comparative results* are given below :—

	Vlei Grass.	Best Meadow Hay.	Medium Meadow Hay.	Poor Meadow Hay.	Clover Meadow Hay.	Wheat Straw.	Oat Straw.
Moisture	6·34	14·50	14·50	14·50	16·00	14·50	14·50
Proteins	4·40	12·05	9·07	6·74	11·10	2·82	3·39
Crude fat	1·56	3·22	2·51	2·09	1·96	1·25	1·80
Nitrogen-free extract ...	45·00	39·88	42·54	44·56	38·99	37·70	37·93
Crude fibre	32·36	23·20	25·00	26·79	25·86	38·14	36·94
Ash	10·34	7·15	6·38	5·32	6·09	5·59	5·44

*Those of hay and straw are from Dietrich & Koenig : "Futtermittel."

The Ash of the Vlei grass consisted mainly of silica.

A sample of *ground maize (mealie) cob* was also examined, with a somewhat similar object, side by side with a specimen of maize (mealies or Indian corn) with a view to the determination of the nutritive value of each. The following results were thus obtained: the low proportions of fat and proteins in the cob should be noted:—

Sample.	Water.	Proteins.	Fat.	Ash.	Total Carbohydrates Including Fibre.	Fibre.	Fuel Value Calories Per Pound.	Nutrient Ratio.
Maize	11·28	9·81	3·68	1·73	73·50	1·88	1665	8·1
Maize Cob ...	9·02	1·75	·89	2·45	85·89	28·66	1631	33·8

It may be of interest to compare these figures with the results of analyses performed in other countries: * some of these are accordingly given below: —

No.	Water.	Proteins.	Fat.	Ash.	Total Carbohydrates Including Fibre.	Fibre.	Fuel Value Calories Per Pound.	Nutrient Ratio.
1	15·0	8·2	3·8	1·4	68·7	1·9	1553	9·2
2	13·35	9·45	4·29	1·29	71·62	2·29	1648	8·5
3	13·33	9·64	3·93	1 66	71·42	2·50	1634	8·1
4	7·01	7·18	6·92	7·23	71·66	23·18	1714	8·9
5	1·47	11·98	4·09	7·56	74·90	26·39	1746	4·8
6	5·93	9·03	2·00	6·20	76·84	28·95	1644	5·8
7	5·74	6·30	1·43	5·54	80·99	32·75	1646	8·2
8	13·72	7·83	4·20	1·72	72·53	8·73	1632	9·4
9	12·90	13·80	3·52	5·90	63·90	9·61	1556	4·5
10	13·0	14·4	...	5·5	...	...	...	...
11	12·86	13·80	...	6·11	...	11·50	...	...

It will be noticed that the first three of these eleven series of figures were obtained by analysing samples more or less similar to the maize now under report. Nos. 4 to 7 are intended to compare with the analysis of the maize cob, although, containing both cob and corn, they are not strictly comparable, but they nevertheless show the increased proportion of fibre. Nos. 8 to 11 are analyses of brans of various classes.

The fuel value, it may be explained, is intended to be a measure of the value of the food as fuel to the body: the physical energy capable of being thus imparted is calculated upon the hypothesis that the fuel value of a pound of either protein or carbohydrates is 1820 calories, and that of a pound of fat is 4040 calories.†

It must at the same time be remembered that the fibre, although included in the carbohydrates and therefore in the calculation of the fuel value, is practically all indigestible. It may, therefore, be of interest to

*The foreign analyses were derived from the following sources of information:—
1. Average of 77 analyses of corn meal used for fodder: "Chemical Composition of American Food Materials;" Atwater & Bryant, U.S. Dept. of Agric., Office of Experiment Stations, Bulletin No. 28 (revised), 1902, p. 56.

2. Average of 137 analyses of maize (Indian Corn), taken from Dietrich & König Futtermittel, 1891, Vol. 1, p. 524.

3. Average of 39 analyses of Indian Corn meal (Corn feed meal) taken from Dietrich & König: *op. cit.* p. 538.

4. Corn and cob ensilage, air dried. Ohio Agric. Experimental Station, Bulletin 127: 1901, p. 183.

5. Corn and cob ground, together with fodder: *ibid.* p. 183.

6. Run of silo: *ibid.* p. 183.

7. Average of ten samples of maize fodder (Stover): *ibid.* p. 185.

8. Maize bran (J. Moser) from Dietrich & König, *op. cit.* p. 612.

9. Average of 303 samples of wheat bran from Dietrich & König, *op. cit.* p. 596.

10. Composition of bran (Stover): "Agriculture in some of its relations with Chemistry," 1897, vol. 2, p. 36.

11. Average composition of bran. (Sibsón): "Agricultural Chemistry," 1892, p. 151.

†(See "Principles of Nutrition and Nutritive Value of Food:" Atwater, U.S. Dept. of Agric. Farmers' Bulletin No. 142, 1902, p. 12).

deduct in each case the fuel value of the fibre from the total fuel values in each of the analyses tabulated above. If we do this we arrive at the following figures: —

	Fuel value (excluding fibre).
Maize	1,589
Maize cob	473
1	1,476
2	1,555
3	1,533
4	778
5	680
6	474
7	323
8	1,279
9	1,168

It appears then that the food value of the maize cob is about one-third that of the maize; at the same time it compares favourably with Nos. 6 and 7 of the foreign samples, although by no means equal to wheat bran.

The nutrient value in any article of fodder is of considerable importance in the calculation of its economic value. It serves to express the ratio of digestible protein (1) to digestible carbohydrates and fats in any food substance, 1 lb. of fat being assumed to be equal to 2¼ lbs. of carbohydrates. In the diet of *human beings* 85 per cent. of the protein, 90 per cent. of the fats, and 98 per cent. of the carbohydrates (fibre excluded) may be assumed to be digestible, but, looking upon the above as fodder for *cattle*, and in the absence of experimental data to the contrary, we may for the purpose in hand consider all the protein, fat and carbohydrates (excluding the fibre) as digestible. The nutritive ratio then, as given in the above tables, is that of the protein to the carbohydrates (less fibre) plus 2¼ times the fat.*

The high nutrient ratio in the sample of mealie cob is due to the very low proportion of protein, in which respect it more resembles fruit than cereal foods. Whether this is generally the case I am, of course, unable to say from one analysis. As I remarked in connection with the investigation undertaken some two years ago in connection with the composition of Colonial oathay, it would be highly absurd to found any definite opinions with regard to the food value of such an article as this upon a single analysis;† and, if it be thought desirable to push the matter further, samples should be taken and analysed at various stages of their growth; they should be collected in different localities, and, in such case, comparisons should be made between the maize and the very cobs from which they have been removed. Unless this is done analyses such as these will have little value, and do not deserve the name of investigation.‡

*(Atwater, *op. cit.*, p. 27).
† (See my Annual Report for 1905, pages 34 to 36).
‡See this Journal, vol. 32, p. 641.

SECOND EGG LAYING COMPETITION.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

RECORD FOR JUNE, 1908, AND TOTALS TO END OF JUNE.

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date. Eggs.	Total per Pen to date. Weight ozs.
1	C. H. van Breda	White Leghorns	1	23	$42\frac{12}{16}$		
			2	3	$5\frac{9}{16}$		
			3	22	$38\frac{9}{16}$		
			4	14	$27\frac{3}{16}$	87	$155\frac{7}{8}$
2	F. Muller ...	Black Minorcas		Nil.		10	20
3	H. Chas. Starke	Buff Orpingtons	9	6	$10\frac{5}{16}$		
			10	2	$3\frac{12}{16}$		
			11	5	$9\frac{1}{16}$	40	$68\frac{11}{16}$
4	J. W. Wright ...	White Wyandottes	13	8	$16\frac{3}{16}$		
			15	1	$2\frac{5}{16}$	20	$40\frac{1}{8}$
5	C. H. van Breda	White Leghorns	17	22	$39\frac{12}{16}$		
			18	21	39		
			19	21	$44\frac{15}{16}$	102	$190\frac{3}{16}$
6	F. T. Hobbs ...	Silver Wyandottes	22	19	$37\frac{5}{16}$	53	$96\frac{7}{16}$
7	H. D. Bradley...	Silver Wyandottes	28	15	$28\frac{11}{16}$	15	$28\frac{11}{16}$
8	J. G. Lay ...	White Leghorns	29	9	$16\frac{8}{16}$		
			30	12	$26\frac{1}{16}$	21	$42\frac{7}{16}$
9	C. H. van Breda	White Leghorns	33	8	$14\frac{7}{16}$		
			34	16	$29\frac{6}{16}$		
			35	6	$11\frac{9}{16}$		
			36	21	$40\frac{2}{16}$	51	$95\frac{1}{2}$
10	R. Johnston ...	Buff Orpingtons	37	6	$11\frac{14}{16}$		
			38	7	$12\frac{15}{16}$		
			39	1	$1\frac{8}{16}$	28	$53\frac{5}{16}$
11	S. Smith ...	Silver Pencilled Wyandottes	41	3	$5\frac{3}{16}$		
			42	9	$12\frac{2}{16}$	12	$17\frac{5}{16}$
12	(Vacant).						
13	S. Smith ...	Brown Leghorns		Nil.			Nil.

RECORD FOR JUNE, 1908, AND TOTALS TO END OF JUNE—*continued.*

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date. Eggs.	Total per Pen to date. Weight ozs.
14	Clifford Hoole...	Black Minorcas	53	12	$23\frac{7}{16}$		
			54	19	$28\frac{10}{16}$		
			55	18	$30\frac{12}{16}$		
			56	20	39	112	$188\frac{1}{2}$
15	S. Smith ...	White Leghorns	57	1	2		
			58	7	$11\frac{14}{16}$		
			59	1	$1\frac{12}{16}$		
			60	17	$29\frac{13}{16}$	100	$175\frac{3}{16}$
16	S. Smith ...	White Leghorns	61	21	$35\frac{6}{16}$		
			63	18	$33\frac{9}{16}$		
			64	16	$27\frac{10}{16}$	117	$198\frac{1}{2}$
17	W. R. Allen ...	White Leghorns	65	3	5		
			68	4	$8\frac{12}{16}$	7	$13\frac{12}{16}$
18	S. Smith ...	White Wyandottes	69	18	$33\frac{1}{16}$		
			70	14	$25\frac{13}{16}$	49	$89\frac{9}{16}$
19	R. W. Hazell ...	Blue Andalusians	74	15	$27\frac{11}{16}$		
			76	15	$30\frac{14}{16}$	56	$106\frac{11}{16}$
20	Clifford Hoole...	Brown Leghorns	77	21	$38\frac{2}{16}$		
			78	19	$33\frac{5}{16}$		
			79	17	$30\frac{12}{16}$	65	$115\frac{5}{16}$
21	R. W. Hazell ...	White Wyandottes	82	1	$2\frac{2}{16}$		
			84	1	$1\frac{12}{16}$	2	$3\frac{7}{8}$
22	S. Smith ...	White la Bresse	85	2	$3\frac{6}{16}$		
			86	18	$32\frac{13}{16}$		
			87	12	$20\frac{1}{16}$		
			88	13	$24\frac{10}{16}$	86	$149\frac{3}{16}$
23	R. J. Williams	Black Minorcas		Nil.			Nil.

CORRESPONDENCE.

The Cape Horse.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—There seems to be a fast growing idea among the general public that South African horse-breeders are only breeding race-horses, or only using Thoroughbred stallions, to, they think, the ultimate deterioration of the South African horse. Now if they only knew it, it is those breeders who have experimented with Hackneys, Cleveland Bays, Flemish and other like breeds, which are entirely unsuited to this country, and as far as I am aware to any other, who have really ruined the reputation of the South African or shall I say Cape horse.

Hackneys, etc., may be all very well to pull some retired "merchant prince" or his family some short distance from his suburban residence to town and back again, and may do this in great style and action, a distance of at the very most no more than ten miles, on the best of roads. But put those same horses to pull say a light buggy fifty miles along our ordinary South African roads, during a day, and perhaps you would never do it; but in any case would they be able to bring you back the next day? And even if they did happen to accomplish this, how many splints, curbs, etc., would be the result.

Or given a cavalry regiment mounted on such chargers, how far would they get under forced marching orders. Compare these with say ¾ bred Arabs or Thoroughbreds. Why do the several prominent Continental Governments spend fortunes yearly in England (a country most of them loathe) on Thorough-bred sires and mares to form foundations for cavalry remount breeding studs. Horses such as "Ard Patrick" "Galtee More," "Rock Sand," and many others each of which realised sums far beyond the highest dreams of the average individual, have been thus purchased. No, the sooner South Africa universally adopts the Thoroughbred (of course the right type, not cast off weeds) or Arabs, the sooner will it regain its name as a reliable horse-breeding country, and we will again be sought after as a source for the supply of remounts to the Indian cavalry and mounted infantry.

South Africa has been proved to be the only country in the world where the famous English Thoroughbred retains his type without the infusion of fresh blood every second generation or so.

The Thoroughbred's heart is as big as himself, and his bone is made of ivory, the right article to tackle our heavy gradients and bad roads. Not so the roadster class whose heart is often *non est* and his bone composed of some porous substances, which springs splints on the least provocation and whose feet are subject on very slight cause to laminitis the bane of the South African traveller.

I hope some abler pen than mine will take up this subject, and conclusively prove that my contention is right. What we require are Thoroughbreds of the celebrated Pearl Diver's type (an ex-Queen's Premium horse, I believe), whose progeny proved on the racecourse that South Africa can breed a horse on a *par* with any country.

Count Lehndorf (perhaps the best judge of a horse in the world), buyer for the German Government Stud, considers that the race-course is the best proof of a horse's stamina to make a reliable sire. Those farmers who cry down racing, must think of this, and also look to the quantity of oats, etc., consumed by horses in training, to whose owners I presume they have no objection to sell their produce as long as the cash is there. In Johannesburg alone there are over five hundred horses in daily training. If this were to suddenly cease, where would all the oat-hay and oats, etc., they at present consume, go to.

Another point I should like to touch on, is why are not farriers licensed and made to produce a certificate of merit before they are allowed to commence business. Very few of the so called farriers doing business in country places know anything about the conformity of a horse's foot. As a general rule a piece of iron (called a shoe) is put on to a horse's foot and his hoof made to fit the iron. The result is

that half the horses in the country suffer from navicular disease and contracted hoofs, etc. And a farrier will quietly tell an owner that his horse's lameness is caused by corns. I knowone man in this district who says that all horses bred here have corns. If the so-called farriers only knew their business, I think there would be fewer corns. Most horses have their feet ruined the very first time they are shod, by having their frogs and soles cut away, and the walls of the hoof rasped down to make a "neat" job. Is not a horse's foot his most important point.—Yours, etc.,

GRIQUA.

Kokstad, June, 1908.

A Sheep Breeding Question.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Can you or any of your contributors give me any information, as to the advisability of shearing rams, just before putting them to the ewes. Last year I put 18 rams to 150 ewes, from the 1st October to the 15th November, and the ewes only dropped 86 lambs. The rams and ewes had 12 months' growth of wool.—Yours, etc.,

G. C. SNYMAN.

The Fountains, Uitenhage, June 9th, 1908.

Citrus Culture—Pruning and Stock Influences.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—My opinion often being asked as to pruning deciduous fruit trees rightly I just wish to give the readers of your *Journal* the benefit of long years' experience. Different kinds of fruit trees require different ways of pruning, but on no occasion have I found that heavy cutting proved beneficial to trees which made a season's poor growth in the wood. Such trees should be fed by the roots and extra attention will (unless it is a sickly tree) in the next pruning season guide the most inexperienced hand, which branches to remove and which to leave to form a shapely tree. It will as a rule be seen that a tree with a heavy crop will make small woodgrowth, and if such a tree is unmercifully cut back instead of being given a heavy dressing of kraal or stable manure, it is ten to one that such a tree if not dead the same year, will lose all energy and remain an eyesore in the orchard.

Now to citrus trees. I rather admire the Masters' system though the results of budding or grafting I found somewhat different than did Mr. Masters, when he wrote about stock influences. I can find no difference in the fruits, viz., a good seedling Naartje tree will, if budded on lemon stock, produce the identical Naartje as the original, only the lemon oil will be slightly in the rind of the Naartje on the lemon root. The union is in the bark and remains in the bark as far as stock influence is concerned. As to the seed influences we have to thank or curse the bees for so playing the fool with us. I hold that the Cape lemon as a stock cannot be beaten, and though not Mal de Gomma proof, this disease can as well be cured as prevented when trees are planted in dry deep sandy or loamy soils, perfectly free from salt.—Yours, etc.,

R. P. MALAN

Monte Cristo, June 11.

Paspalum Dilatatum.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Although long ago fully alive to the value of Paspalum as a pasturage improver, especially in the Western Province, where all our native grasses seem to lack a meat-productive capacity, we doubted its drought-resisting qualities, when planted or sown on the hillsides, which remain perfectly parched during the summer months, and where only it would be of value to us personally, as we have no ground damp in summer at our disposal for that purpose.

With that object in view, therefore, we gave it a trial last summer, sowing some seed, obtained from the Agricultural Department, in October in dug-up ground on the hillside, where it not only germinated satisfactorily, but, in spite of the heat and drought during summer and the constant nibbling of the sheep (which are passionately fond of it, more so almost than of any other grass), it developed so well that it has become quite established in that part, and has thoroughly proved its value as a pasturage grass for dry soil.—Yours, etc.,

LOUW BROS

Neethlingshof, Stellenbosch, June 12.

Sheep Tail Eater.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In reply to Mr. D. Botha's letter in the issue of your *Journal* of March, I agree with his remarks therein that dogs bite off the tails of lambs as the dog will commence playing with the lamb, and will end up by depriving the lamb of its tail, and perhaps a bit more, as a dog if it once gets the taste of warm raw blood, will continue eating until it has probably devoured two-thirds of the lamb. The dog would soon have the same fancy for killing and eating lambs and sheep too. I have also had pigs that will kill lambs and eat then almost the whole carcase; leaving only the trotters and a part of the skin. A few mornings after the two lambs' tails were gnawed or torn off, I went to the enclosure where the sheep were always kept in over-night, and I was surprised to find that an owl, which would measure close upon 3 feet in height, when sitting straight up, had been caught in the barbed wire fence, the cross barbed wire catching the wing in the sinew part so securely that it was unable to free itself again. We soon put an end to him, and perhaps our schelm toe may not be a four-legged animal, but a bird of prey, as since the capture of this owl we have not lost any lambs or tails at night. This, to a large extent, proves my theory, as this bird would not bite the tail off the lambs, but would have to tear or gnaw the same off. An owl can easily do this by burying its claw in the lambs back or wool, and no lamb will be able to shake it off. As the poor lamb runs along, so the owl can be tearing the fat from the tail, and when the lamb drops from exhaustion, the bird can have a proper feed. A friend of mine in the Graaff-Reinet district, as well as farmers in this, are complaining very much of the nuisance of these sheep tails eaters. Some farmers think that it must be a Red Cat, as it is very fond of fat. I trust to read further letters on this subject.—Yours, etc.,

"LIKE TO KNOW."

Excluder Zinc at the Entrance of Hives.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In the May number of the *Journal*, Mr. Hardwick describes my plan of placing excluder zinc over the entrance of hives as a "big mistake." Undoubtedly he is right where there are no pests, but I find this the lesser of two evils.

The loss of pollen is very small, and if the excluder is so cut that the bees can run straight into the hive along the floor board, without having to pass over the zinc, does not occur at all. As to the queen losing itself, this is liable to occur at any time whether excluder be used or not. I have never lost one queen, and have hived swarms with it on, and watched the queen run along the entrance until she has found the opening. Three queen spaces can be left, one at each end and the centre.

A ⅜ inch entrance though preventing moths and mice, does not exclude the beetle, which does great damage to the young larvae, besides keeping the bees in a state of constant irritation. Besides in this hot and oppressive climate, when bees are clustering at the hive entrance to obtain air, it is often very advantageous to keep the entrance more than ⅜ inch. I find that bees, especially those obtained from holes in the ground, will occasionally leave the hive during the first day or so after being driven, in spite of the brood, but with the excluder the queen is detained, and after clustering on some neighbouring bush for a few minutes, they return and settle down.

In regard to bee-pirates the only practical way of tackling them is to find their nests in the ground and destroy them.—Yours, etc.,

W. H. EDMUNDS.

Gamabot, Vryburg.

Classification of Wines for Shows.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I should be very much obliged if through your *Journal* you would permit me to ask some explanations from those who regulate the annual wine show of the Board of Horticulture. The object of this show is to point out to those interested in the wine trade, the different qualities of the wines produced in the different districts and so help the sale of it.

The wines produced in this Colony are grown from the following varieties :—

Red wines.—Hermitage, Cabernet Sauvignon and Shiraz.

White wines.—Stein, White and Red Green Grape, French Grape and Riesling.

Dark wines.—Pontac and Othello.

Sweet wines.—Red and White Muscadel, Red and White Hanepoot.

On looking through the prize list of this year's show I note that a prize is given for wine made only of one kind of grape. Also a prize for red or white wine made of any other variety not mentioned. Under the heading of sweet wines or sweetish wines mention should be made as to what quantity of natural grapesugar is allowed in each case as a minimum. I should further like to have a definition given of the word type for which there are prizes under the various so-called types. Grammatically type would seem to mean having in general certain characteristic qualities. I don't see how any other signification could be given to the word type.

Sauterne type means therefore a wine which possesses or has a semblance to the qualities which characterise the real Sauterne wine. But it is impossible to produce this type of Sauterne wine in South Africa for the simple reason there are no vines of that type grown here at the present time, and it stands to reason that in order to produce a certain specified type of wine grown in France, you must begin by having the same varieties of vines. After procuring which one must study the special culture according to the soil and climate to get as near as possible to that where it is originally grown. This applies to Burgundy type, Hock type and Sherry type also.

Class 2 is worded as follows : Best 10 Leaguers of Wine of Sauterne type, and underneath between brackets (white wines between Hock and Sherry type). Therefore according to this a Sauterne type is considered to be a wine possessing some qualities of a Hock and others of a Sherry, which is absurd. I think therefore that it was the intention of the committee to indicate by Hock a light wine, by Sherry a heavy wine, and by Sauterne a medium wine having its alcoholic strength between the two former ones. I take this for granted as I see no other alternative. But this also is absurd as it clashes with regulation No. 7 *re* amount of alcohol allowed.

For the following reason. For a laboratory operating on a small quantity and very carefully 17° by vol. may be obtained as the saccharometer cannot move about in a solution of this alcoholic strength; but practice shows that with a lot of care and under special favourable conditions a wine of 16° by vol. could be obtained. If now you admit 15° by vol. as the limit for light wines, and as in practice you cannot produce wines higher than 16° by vol., the Sauterne type and Sherry type should be between 15° and 16° by vol. and practically equal. At the present time "we do not know where we are" (in the words of the song). It is high time the committee gave us a clear definition for each class of wine. In this country, where all the wines are produced from a small number of varieties, and as the farmers wish to keep the prizes given for wines obtained from one kind of grape, I think it is logic to classify the wines not by high sounding names which mean nothing, and only confuse the competitors but by their alcoholic strength. As for instance :—

Light wines should be natural wines, whose alcoholic strength should not exceed 11° by vol.

Medium wines should be natural wines, whose alcoholic strength should be between 11° and 13° by vol.

Heavy wines should be natural wines, whose alcoholic strength must be at least 13° by vol.

These wines could be obtained from the mixtures of two or more varieties of vines, and such a classification would simplify the judging. It is evident that a wine of 11° has less bouquet than a wine of 14° (when quite young), and if both are shown in the same class the former would never take a prize. You have only to consult the analysis made from prize wines of previous years, and you will see that the silver cups for the light wines, red and white, were given to wines of higher percentage of alcohol than 11° by volume.

As regard the quantity of volatile acid allowed, I think it is advisable to raise the standard in order to give a chance to the wine farmers who have not the implements and machinery to secure a regular fermentation, and propose therefore

8 for light wines, 9 per mille for medium wines, and 10 per mille for heavy wines. As regard the quantity from which the sample has to be taken, I should advise to bring this to 7 leaguers instead of 10 leaguers as the average size of the stukvats in the farmer's cellars is about 7 leaguers. One case contains 12 bottles, why not fix for each sample three bottles instead of four. In the former case a farmer could thus despatch 4 samples in one case. Let me point out another anomaly in regulation 9 where it is stated that only Bass's ale quart bottles are to be used. Why not wine bottles. I would suggest the dark quart bottles. If the wines were classified according to strength, then the wines for these special classes light, medium and heavy, should be tested by the analyst for strength and volatile acid before the judges taste them, in order to have them correctly classified. I propose to limit the quantity of *unfermented sugar* in show wines as this is a far more important matter and more dangerous for the conservation of wine than the question of volatile acid of which such a strong point is made, and to limit the same to one gramme per litre. I say one gramme because other gum matters in the wine act on the Fehling solution, and by experience I know that this can come up to ½ gramme. The unfermented sugar is the nourishment of the microbes, aerobic and anaerobic, and often the use of sulfurous acid (S.O.2) is powerless to cheque their growth. Whereas one can avoid the acetification of a wine by the treatment of sulfurous acid (S.O.2). A large quantity of the so-called sour wines (getting sour about November) is caused by the mannitic fermentation, because unfermented sugar remained in the wine, and if the analysts want to go into the matter they will find that I am correct, but up to the present one has never heard complaints in this country of the presence of mannite.

If this latter proposal is carried out no wine show could be held before October as at the present time when the show is held in June the second fermentation has not taken place and until it has no bouquet can be formed as before the second fermentation the wines contain too much carbonic acid and no etherification can take place, and a judge can easily mistake a perceptible smell from the soil which eventually disappears as being a bouquet of the wine.

Under Section C. one sees a prize for *pure wine vinegar;* but that for brandy is only for *wine brandy;* why not *pure wine brandy;* if it were so I think there would not be many entries that would pass the analytical test, which ought also to be limited to 150 milligrammes per litre.

As it is, a mixture of wine spirit, water and essence can come under the heading of wine brandy.

Class 21.—Why should this be restricted to one certain liqueur, namely Van der Hum?

There might be other points to be raised but I have just pointed a few of the most glaring, and will not further use up space in your valuable paper.—Yours, etc.,

R. SANTHAGEN.

Vlottenberg, June 23.

Bees do not Injure Fruit but Fructify it.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In reply to the question of Mr. "Would like to know," whether bees injure fruit, I am fully convinced that bees do not harm it. It would be foolish to maintain that these little creatures are guilty of it. I too was under the wrong impression, but I have watched them, and find that it is quite the other way, for bees are indispensable to fruitgrowers.

In contemplating a flower one finds in the centre a short stem with a rather sticky point or little crown: around it there are other stems with fine flour. This flour has to fall on the middle stem in order to pollinate (fructify) it. If that does not happen, it remains unfruitful, and bees are absolutely best to bring the pollen on the crown of the flower. Pumpkins, watermelons, etc. bear male and female blossoms. The male flower is provided with pollen. The female flower has to be fructified by receiving pollen from the male flower, and how will it get it if bees don't carry it on their legs or wings?

When fruit is ripe, bees are as useful and beneficial. They suck out the rotten juice, prevent the fruit sometimes from further decay, and prepare a delicious syrup of it.

Many maintain that bees prick ripe grapes and then suck out the juice. That is a foolish idea. Bees won't injure nor touch a grape, unless grapes are cracked or have been pecked by birds. If one only observes, one will find that bees are only feeding in portions of vineyards, where sugarbirds are troublesome, and peck at the

grapes. It would be foolish to prevent bees from sucking the juice of damaged fruit, for if bees did not suck dry the juice of such fruit, it would decompose, and also affect sound berries. I would advise Mr. "Would like to know" to test the following: Suspend two bunches of ripe grapes in front of a bee-hive, prick one of them that the grapes get moisty, leave the other undamaged and see what is the result.—Yours, etc.,

A. J. LE ROUX.

Scherpenheuvel, Franschhoek, 30 June, 1908.

Dogs and Jackals.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I quite agree with Mr. Lock, Welbedacht, regarding the destruction of jackals, for Mr. Lock has experience of having consideration for a few good dogs. I notice that associations have carried resolutions, asking divisional councils to allow occupants of land to keep two dogs free of tax. Well, for the Barkly West district it certainly is not desirable, for there are too many jackals here and farmers have only too much consideration for a couple of good dogs, and in that way the foxes are allowed to breed. If every farmer does his duty in laying poison regularly we shall generally be less troubled by foxes. I know that by experience.—Yours, etc.,

A. P. CLAUSE.

Blikfontein, Barkly West, 9 June, 1908.

The Port Jackson Willow once more.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Would you be so kind as to publish these few lines in your esteemed paper as it is impossible to reply privately to all the enquiries regarding the Port Jackson willow. At 3 years' growth the tree is about 5 to 6 feet, and commences to give seed; in 8 years it is about 20 feet with a flat top. You may then commence cutting poles. It is a winter tree, its leaves do not fall off. Frost does not do it any harm. It grows into a close.dense tree, as dense as an orange tree. Small stock are particularly very fond of its seed. It will grow well in the whole of the Southern belt, from Cape Town to Natal, also Griqualand East. My idea is not to sit and sell seed, I have quite enough other business to do, but only to make the tree more widely known. It is a much better tree than a bark tree (Wattle) or bluegum, which are to a farmer nothing compared with Port Jacksons.—Yours, etc.,

J. D. BENEKE.

Ruyterbosch, Mossel Bay.

Divining Rod Enquiries.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Would not one of those, who know how to work the divining rod, reply to the following questions, either in the *Journal* or privately? I would be very much obliged. What kind of wood is used for it? What is to be the size of the rod? How is it to be held, erect or level? With both hands, or one? With the thumbs round the wood, or along the wood?—Yours, etc.,

J. D. BENEKE.

Ruyterbosch, Mossel Bay.

Judging Sheep by Points.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Allow me to ask through the medium of your *Journal* whether any of our veteran farmers or show judges could give in detail the "points" required in a champion or perfect merino sheep-ram or ewe. We have heard much lately about judging by points.—Yours, etc.,

"FLEDGELING."

The following are the S.A. Stud Book Points for Merino Sheep :—

1.	Head, horns and mouth	5
2.	Constitution	10
3.	Symmetry	15
4.	Size of Carcase	5
5.	Density of fleece and evenness of covering	15
6.	Quantity of fleece, including evenness of serration	10
7.	Length and evenness of staple	15
8.	Lustre and fluidity of yolk	10
9.	Weight of fleece	15
		100

My Opinion about Burning of Veld.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I should like to know the opinion of the public whether it is good to burn veld or not. My opinion is that it is a good thing to burn, especially in the district, where I am living. The best of it is that thereby the rank vaalbos is being diminished gradually. And also the red grass which grows from 3 to 4 feet high. If burnt down it takes a good deal of time to grow as high again. Some people will say that burning also burns down the sheep bushes, but my opinion is that these bushes are becoming too old and too woody; after burning new shoots appear, which form softer food. Grass gets also too old, and the old grass starts rotting and no new grass is forming. White "steekgras" is also very plentiful on farms where the grass is allowed to rot. Another nuisance of unburnt redsand farms is, that one wants two shepherds there for one one wants on a "kaal" farm. I can assure you that there is very little disease on this farm. The worst disease is that we lose too much stock through the vaalbos pest. And if the lost sheep is in the wilderness the jackals take good care to remain its herd. I understand well that there are farms where there is very little grass, which will not burn and yet are one large stretch of vaalbos. But owners of such farms might tell poor people, who have no food to eat every day : Come and take so and so much vaalbos from my farm, with root and all, without price, instead of letting the poor people pay from 10s. to £1 per load. Such owners may keep out small patches of vaalhout for their own use, and for fuel. But stock make very little use of it. And instead of the vaalbosje there might be grown more valuable varieties of bushes. Recently Mr. Bosch has called on people for the purpose of sending for a number of rams, but he could not get sufficient people to go in for it and make up the full list of rams. I have also talked this over with Mr. Bredenkamp, but he says the sheep are very good, but the veld is too wild. And such thoroughbreds are naturally too sensitive. They do not answer well on account of the wild veld. Coarse sheep are better suited to coarse veld. Therefore I would like to know whether my opinion is right or not.—Yours, ets.,

FRED. J. LOCK.

Welbedacht, Barkly West, 25 June, 1908.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I have read in the *Agricultural Journal* about burning the veld. When I came into the district of Swellendam in 1857 there was grass in abundance, now there is nothing but "rhenoster bush" and grass is quite wanting. In 1882 I bought the farms Geluk, Hoop en Zanddrift. Since that time I have not burnt, but regularly taken care that the water should not run down the sluits, and carefully diverted

it so as to have the pasture watered. I have found that the Karoo bushes increase and the rhenoster bushes decrease. And when then the rain comes, the water has not a free running, but the fallen rhenoster bushes check the water, so that the veld gets well or better drenched. And if flood water comes, it does not find a hard, washed away ground but fertile soil not only brought by winds, but by nature by means of manures (fertilizers) which otherwise are carried away by wind and rain. The appearance of my cattle told of the difference there was. But now the trains pass through and I am no more there in order to prevent the floodwater to do harm to the pasturage instead of benefitting it. The railway causes great damage to my farms. It goes about 5 or 6 miles through my veld and turns the water into noxious trenches, where otherwise it did a lot of good. You see therefore there is a difference between here and the grassfields in the East. Farmers here say they have to burn their veld; if it keeps on in that way for another 50 years, I am afraid of what will become of our stock.—Yours, etc.,

AN OLD FARMER.

Montagu, June 8, 1908.

Sheep Shearing Machines—The Agents' side.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—We see a letter from C. W. Webster in your May issue, and we would like to explain his grievances.

No man on earth can shear 500 sheep per day either by hand or machine. We did not at any time guarantee this.

Everyone knows what a blunt razor is. It won't shave. The shearing combs and cutters must be kept sharp to do clean work, and this we clearly state in the instructions. If he had followed out these he would now be shearing from 75 to 100 sheep per diem and obtaining an average of one pound of wool more per sheep. The nipping of the sheep is entirely due to blunt knives. He tells us he shore 150 sheep without sharpening properly. These should be ground for every ten sheep or so according to the state of the wool. We clearly state this, yet he appears to know better than the manufacturers.

In these instructions it is stated that combs and cutters *cannot* be ground on oil stones or grindstones, but a special grinder is made for the purpose on which combs and cutters are sharpened in ten seconds. Again he disregards this advice and uses oil stones with the result that the faces are ground off the square which keeps the knives from cutting just the same as if you loosen the screw in a pair of scissors and try to cut a piece of material. The scissors will not cut, neither will combs and cutters sharpened in this manner shear sheep.

We are at a loss to account for the deafening grinding noises which he tells us the machine makes. We think that a doctor might put this matter right for him. The machine makes no more noise than a sewing machine.

An intelligent native shearer with one season's practice will shear up to 150 sheep or goats per diem, shearing them better and obtaining one pound or more wool per sheep than any hand shearer ever shore in this Colony.

We quite understand that Mr. Webster "fails to see the advantage of machine shearing." He has the honour of placing his opinions versus the owners of twenty million sheep which were shorn with our Stewarts machines last year (to say nothing of the number shorn with other makes of machines), men who laid down as much as £1,000 to erect their plant, men who know the value of machine shearing, and men who are both practical and intelligent. We do not think that the opinion of Mr. C. Warren Webster, Commadagga, South Africa, will influence these highly trained men to sell out their plants and revert to hand shearing.

We are sending you per seperate cover a copy of our catalogue, and leave it to you to discover therein any of the guarantees as stated by your correspondent.—Yours, etc.,

ALEXANDER & Co.,

Sole South African Agents for Stewarts Shearing Machine.

Port Elizabeth, June 10th, 1908.

NOTES ON THE WEATHER OF MAY, 1908.

By Thomas W. Rees, B.A., LL.M., Assistant Secretary to the Meteorological Commission.

A mean barometic pressure slightly higher than usual, a deficiency of rainfall averaging 66 per cent., a particularly warm period over certain districts of the Colony from the 18th to the 22nd, an abnormally small number of thunderstorms, few severe frosts and a mean cloudiness below the average, were the leading features of the weather of the month.

Division.	Mean Rainfall (1908).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	1·83	9	4·80	9	—2·97	— 62
South-West ...	0·93	5	2·90	7	—1·97	— 68
West Coast ...	0·22	2	1·51	5	—1·29	— 85
South Coast ...	0·91	5	2·36	6	—1·45	— 64
Southern Karoo ...	0·70	2	0·99	4	—0·29	— 29
West Central Karoo ...	0·26	2	0·85	3	—0·59	— 69
East Central Karoo ...	0·65	2	0·79	3	—0·14	— 18
Northern Karoo ...	0·41	2	0·85	3	—0·44	— 52
Northern Border ...	0·09	1	0·62	3	—0·53	— 85
South-East ...	0·87	3	1·35	5	—0·48	— 35
North-East ...	0·62	2	1·02	4	—0·40	— 39
Kaffraria ...	0·34	2	1·10	4	—0·76	— 69
Basutoland ...	0·29	2	1·38	4	—1·09	— 79
Orange River Colony...	...	...	1·04	3	...	...
Durban (Natal) ...	0·37	4	1·79	...	—1·42	— 79
Bechuanaland ...	0·00	0	0·50	1	—0·50	—100
Rhodesia ...	0·06	1	0·45	1	—0·39	— 87

Precipitation.—The mean rainfall, deducted from the records of 347 stations, was 0·71 in., falling on 3 days, being 1·10 in., or 66 per cent. below the average. This is 372 per cent. less than last month, and 455 per cent. less than in the corresponding month last year. An examination of the accompanying table will show that the deficiency of rainfall was general over the Colony, Basutoland, Bechuanaland and Rhodesia. The amount of shortage ranged from 100 per cent. in Bechuanaland to 18 per cent. over the East Central Karoo. It averaged over the whole area before mentioned the large amount of 64 per cent. An analysis of the totals for the month shows that of the 347 stations reporting only 24 reported "Nil,"; 127 had 0·01 to 0·50 in.; 114 had 0·51 to 1 in.; 65 had 1·01 to 2 ins.; 14 had 2·01 to 3 ins.; leaving three stations recording more than 3 ins. These were all on Table Mountain, viz.,

Waai Kopje with 3·90 ins.; St. Michael's with 3·63 ins., and Kasteel's Poort with 3·45 ins. On similarly treating the maximum amounts recorded in 24 hours, it is found that of the 342 stations furnishing the necessary details (and omitting the 24 with "Nil"), 237 had maxima ranging from 0·01 to 0·50 in.; 72 had from 0·51 to 1 in.; whilst nine only had records exceeding one inch. These were Elsenberg Agricultural College with 1·80; Woodifield (George) with 1·65 in.; Ladismith with 1·52 in.; Glencairn (Cathcart) with 1·40 in.; Lemoenfontein (Beaufort West) with 1·30 in.; Tulbagh with 1·09 in.; George with 1·06 in.; Kei Road with 1·05 in.; and Kenilworth (Cape) with 1·04 in. It will thus be seen that not only was the rainfall generally but slight, but the precipitation during the 24 hours was also small. It could not be said that there were any good soaking rains, such as would to any extent penetrate the ground and which have been beneficial to farm lands.

Thunderstorms were very few in number, only 74 being reported on nine days of the month, almost the whole of which occurred on the 25th. It is no doubt on account of the abnormally few thunderstorms that the rainfall has been so deficient. In the same month last year there were 383 instances recorded, and during that period the rainfall was 455 per cent. heavier than it was this. *Hailstorms* were consequently almost entirely absent, only three being reported on one day of the month, viz., the 25th. *Snow* was only reported from one station, viz., Broughton (Molteno) on the 25th. *Sleet* does not appear to have occurred anywhere, which is unusual for the time of year.

Temperature, Cloud and Wind.—The mean temperature of all the stations (58·1°) was higher than the average by 1·2°, being only 0·5° colder than the previous month, and as much as 3·7° warmer than the corresponding month last year. This increase in temperature is entirely due to the day temperatures being considerably higher than usual; being 6·4° more than in the same month last year, and 0·9° more than last month. This is accounted for by a particularly warm period from the 18th to the 22nd over the Cape Peninsula, South West, West Coast, South Coast, Southern and Northern Karoos. The mean warmest station was Queenstown with 66·5°, and the mean coolest station Hanover with 48·0°, a difference of 18·5°. The highest mean maximum was 79·8° at Queenstown, and the lowest 62·1° at Disa Head. The warmest days were most commonly the 7th, 21st, 22nd and 23rd. The coldest mornings were mostly those of the 1st, 17th, 28th, and 30th. The mean of the absolute maxima was 83·5° as against 88·1° in the previous month, and 75·9° in the same month last year. The mean of the absolute minima was 37·6°, as compared with 38·7° last month, and 34·9° in May, 1907. The mean monthly range was therefore as much as 45·9°. The highest readings registered during the month were 96·0° at Queenstown, on the 12th; 93·0° at Port Nolloth, on the 22nd; 90·0° at Mossel Bay, also on the 22nd; and 89·0° at the Royal Observatory, Storm's River, East London and Umtata, principally on the 21st. The lowest readings recorded were 27·0° at Murraysburg and Hanover, on the 16th and 30th respectively; 27·5° at Aliwal North, on the 9th and 30th; 28·0° at Rietfontein (Aliwal North), on the 30th; and 29·0° at Mohalie's Hoek and Teyateyaneng, both on the 28th. The extreme monthly range was 69°, compared with 89° last month, and 64° the same month last year.

Frosts were reported from 112 stations as having occurred on each day of the month, chiefly from the 25th to the 31st. These were, generally speaking, light and caused but little if any damage. *Fogs* do not appear to have been very numerous, only 93 instances having been recorded as happening on each day of the month, with the exception of the 1st and 2nd.

The mean amount of *Cloud* was 34 per cent., being 6 per cent. less than the previous month, and 18 per cent. less than in the same month last year. The amount of sky obscured was greatest (50 per cent.) over the West Coast, and least (19 per cent.) over the Northern Border. The stations where the amount of cloud was less than 25 per cent. were Hopetown (10 per cent.), Tabankulu (18 per cent.), Sydney's Hope (21 per cent.), and Cathcart (22 per cent.).

The prevailing morning *Winds* along the Coast starting from Port Nolloth, and going Eastwards to Durban were South Easterly at Port Nolloth, South Westerly at Dassen Island, South Easterly at Cape Point, Easterly at Danger Point and Cape Agulhas, Northerly at Mossel Bay, Westerly at Cape St. Francis, North Westerly at Port Elizabeth, East London and Port St. John's, and Westerly at Durban. Inland, the prevailing wind direction was as variable as it was along the Coast, being South Easterly at Kenhardt, Kimberley, Aliwal North and Rietfontein, Northerly at Murraysburg, North Westerly at Cathcart, South Westerly at Stutterheim, North Westerly at Lovedale, and Westerly at King William's Town. The mean *Wind-force* on the Beaufort Scale (0 to 12) was 1·42, corresponding to a mean velocity of 10·1 miles per hour, being 2·6 miles less than last month, and 1·8 miles less than May last year. *Gales* were almost unknown, being reported from only 7 stations on 5 days. None of these appear to have caused any damage whatever. *Hot Winds* were noted at 12 stations on 6 days, more particularly on the 19th and 20th.

OBSERVER'S NOTES.

MAY, 1908.

VRUCHTBAAR.—Owing to the light rainfall since the beginning of this month, most of the farmers are very much detained with their ploughing. In oranges and naartjes, this district has a beautiful crop this season.

KERSEFONTEIN.—Very dry month with hot winds, stopped the ploughing of the whole district.

THE TOWERS (Malmesbury).—Hot and dry. Veldt and crops suffering from drought.

SUNNYSIDE (Uitenhage).—Hot North wind on several days during the month. Young crops look healthy. Fruit trees—almonds, peaches, pears and apples—all in bloom. Looks more like the spring than winter. All citrus trees a mass of flowers.

UITENHAGE PARK.—A dry, variable month, low night temperatures, but only one white frost, five hot winds.

PRINCE ALBERT.—Drought slightly relieved. Cool and dry atmosphere.

THEEFONTEIN.—Very fine weather during this month. Prevailing winds N. and N.W. Several sharp frosts towards the end of the month.

HUXLEY FARM (Stutterheim).—The weather was most disappointing.—1½ inches less than last year for the month of May. A serious lookout for winter, and a shortage of water. Stock doing very well, winter lambs coming on fine and strong.

CASTLE HILL (Aliwal North).—Only about four severe frosts this month, remarkable mild weather. Stormy weather on 19th and 20th South of Stormberg.

LAURISTON (Barkly East).—Nights cold and frosty, but the days are simply perfect and much appreciated by men and beast. Mountains in the distance slightly tipped with snow.

SUNNYMEADE (Albert).—The weather has been very promising for rain all the month, but very little has fallen. Since the 25th the cold weather has started with heavy frosts and cold N.W. winds.

THIBET PARK (Queenstown).—One of the very worst seasons experienced; stock dying now, the beginning of winter, from poverty. Poor uitlook for the winter. Rivers and dams only half full.

KOKSTAD.—Severe frosts every morning. Mealie crops a failure.

TENT KOP (Maclear).—Rather cold for the month owing to the presence of snow. Ground nice and moist; all stock in good condition.

ARMADILLO CREEK (Vryburg).—Very warm weather the whole month, with the exception of last four nights. Two slight frosts, no wind to speak of. Stock of all kinds doing very well.

KOKSTAD (The Willows).—Very little rainfall this month, less than a quarter of an inch spread over four days. Frequent frosts, but none severe.

MOUNT AYLIFF.—The iniquitous and wanton destruction of the veldt by grass burning is now being carried on. There are now in this district miles of veldt black as coal and dry as a bone. It is painful to note in places the destruction of young trees and shrubs by this wasteful and unnecessary system. Any savage with a few goats, even the irresponsible herd boys are at liberty to damage the country without let or hindrance. The amount of harm done would justify any government in taking up a firm position, even against the Kaffirs.

CARNARVON FARM.—This has been one of the most pleasant months of May recorded since 1901. A notable feature of the month's weather was the absence of wind—recorded on five days only, being 4 less than the average. The ten (10) *frosts*, recorded are slightly under the average. The number of "Cloudless" days was one. Agricultural prospects are not over bright as only small quantities of wheat, oats and barley are sown, and that sown in March and April only partially came up, germinated and died.

The amount of rainfall on the 26th was not sufficient to plow with, but was beneficial to crops already up. Stock in good condition, and unless winter is exceptionally severe, there will be no serious losses.

Year.	Rain.	Frosts.	Wind.	Cloudless days.
1901	0·30	18	10	10
1902	0·20	8	9	3
1903	2·59	6	14	1
1904	0·24	18	8	6
1905	1·97	9	7	1
1906	1·51	10	7	5
1907	0·99	13	12	1
1908	0·91	10	5	1

MAY, 1908.

Stations.		Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory	...	67·8	51·9	59·8	89·0	21	43·4	9
Wynberg	...	69·4	51·4	60·4	85·0	21	44·0	1
Blaauwberg	...	67·8	52·7	60·2	88·0	21 & 22	45·5	9
Table Mountain (Disa Head)		62·1	49·3	55·7	74·5	21 & 22	39·0	15
Cape Town (S.A. College)	...	72·7	50·2	61·4	87·0	21 & 22	44·0	1 & 9
Bishopscourt	...	69·5	53·7	61·6	86·0	21	45·0	1
Devil's Peak	...	66·1	50·9	58·5	84·0	21	43·0	9
Simonstown	...	72·3	55·9	64·1	88·5	22	51·0	18 & 19
Groot Constantia	...	68·7	51·7	60·2	85·0	22	46·0	17
Danger Point	...	65·5	50·2	57·8	74·0	23	40·0	13
Ceres	...	68·1	39·4	53·8	72·0	24	36·0	7
Elsenberg (Agri. College)	...	71·1	45·2	58·1	84·3	22	34·6	1
Robertson (Plantation)	...	74·9	41·7	58·3	88·0	19 & 22	32·0	17
Port Nolloth	...	65·7	44·5	55·1	93·0	22	38·5	28
Cape Agulhas	...	66·1	55·1	60·6	82·0	24	49·0	9
Port Elizabeth	...	69·3	54·5	61·9	84·0	21	47·0	30
Dunbrody	...	76·4	44·2	60·3	88·1	21	34·2	1
Van Staaden's	...	71·0	50·0	60·5	85·0	20 & 21	39·0	7
Cape St. Francis	...	68·4	53·6	61·0	87·0	14	46·0	2 & 9
George (Plantation)	...	69·7	49·7	59·7	85·3	21	39·0	4
Heidelberg	...	71·1	42·9	57·0	87·0	22	36·0	1 & 18
Storm's River	...	71·3	49·9	60·6	89·0	21 & 22	40·0	1
Mossel Bay	...	70·8	51·6	61·2	90·0	22	45·0	1
Amalienstein	...	73·6	39·3	51·4	86·0	20	32·0	18
Murraysburg	...	68·1	35·7	51·9	79·0	5	27·0	16
Hanover	...	59·5	36·5	48·0	70·0	14	27·0	30
Kimberley	...	75·5	41·4	58·4	84·1	6	32·9	30
Kenhardt	...	76·9	43·5	60·2	87·0	4 & 5	33·0	31
Hope Town	...	74·7	38·9	56·8	82·0	5	33·0	28 & 30
Lovedale	...	73·7	43·0	58·3	83·0	15	35·0	1
King William's Town	...	77·0	45·7	61·4	88·0	20	37·0	29
Evelyn Valley	...	66·7	47·0	56·8	77·0	14	35·0	1
Stutterheim	...	73·5	46·0	60·0	83·0	6	35·0	1
Cathcart	...	67·8	41·3	54·5	75·2	7	30·1	1
Sydney's Hope	...	70·6	51·5	61·0	82·8	20	42·0	1
East London	...	70·7	51·0	60·8	89·0	16	32·0	18
Aliwal North	...	72·1	32.8	52·4	78·5	4 & 7	27·5	9 & 30
Queenstown	...	79·8	53·2	66·5	96·0	12	46·0	25
Rietfontein (Aliwal North)	...	66·2	34·9	50·5	74·0	7	28·0	30
Port St. John's	...	73·6	52·4	63·0	87·0	16	47·0	21
Kokstad (The Willows)	...	68·1	34·9	51·5	79·2	7	27·5	30
Main	...	71·9	44·1	58·0	84·0	7	36·5	1
Tabankulu	...	70·1	44·4	57·2	80.3	7	36·8	30
Mount Ayliff	...	74·7	45·3	60·0	86·5	7	38·0	28
Umtata	...	75·0	40·9	58·0	89·0	7	33·0	31
Mohalie's Hoek	...	67·5	35·1	51·3	78·0	25	29·0	28
Teyateyaneng	...	68·3	36·1	52·2	75·0	6 & 8	29·0	28
Kuruman	...	73·1	46·7	59·9	81·0	4	35·0	26
Hope Fountain	...	70·9	46·9	58·9	79·8	8	41·1	13
Means	...	70·5	45·9	58·1	83·5	...	37·6	...
Extremes	...	...	...	...	96·0	12	27·0	16 & 30

RAINFALL, MAY, 1908.

I. CAPE PENINSULA:

	INS.
Royal Observatory (*a*) 12 in. gauge	1·23
Cape Town, Fire Station	1·32
Do. South African College	1·59
Do. Molteno Reservoir	1·88
Do. Platteklip	1·70
Do. Signal Hill	1·18
Do. Hospital	...
Sea Point, The Hall	1·08
Do. Attridge	...
Camp's Bay	1·09
Table Mountain Disa Head	1·74
Do. Kasteel Poort	3·45
Do. Waai Kopje	3·90
Do. St. Michael's	3·63
Devil's Peak Blockhouse	2·29
Do. Nursery	2·14
Do. Lower Gauge	...
Woodstock, The Hall	1·64
Do. Municipal Quarry	2·03
Do. do. Nipher's Shield	2·27
Newlands, Montebello	...
Claremont, Carrigeen	...
Bishopscourt	2·22
Kenilworth	2·16
Wynberg, St. Mary's	1·07
Groot Constantia	2·28
Tokai Plantation	1·51
Plumstead, Culmwood	1·78
Muizenburg (St. Res.)	...
Fish Hoek	...
Simon's Town, Wood	1·54
Do. Gaol	...
Cape Point	0·81
Blaauwberg Strand	0·75
Robben Island	0·68
Durbanville	...
Maitland Cemetery	1·51
Tamboer's Kloof	1·56
Woodhead Tunnel	2·82
Lower Reservoir, Table Mountain	1·73

II. SOUTH-WEST:

	INS.
Eerste River	1·10
Klapmuts	1·17
Stellenbosch, Gaol	1·05
Somerset West	1·41
Paarl	1·51
Wellington, Gaol	0·93
Do. Huguenot Seminary	
Groot Drakenstein, Weltevreden	
Porterville Road	1·09
Tulbagh	1·63
Ceres Road	...
Kluitjes Kraal	0·79
Ceres	0·60
The Oaks	...
Rawsonville	0·18
Caledon	0·94
Worcester, Gaol	0·02
Do. Meiring	...
Worcester, Station	...

II. SOUTH-WEST (*continued*):

	INS.
Hex River	0·20
De Doorns	...
Karnmelks River	0·79
Lady Grey, Division Robertson	0·44
Robertson, Gaol	0·17
Do. Govt. Plantation	0·12
De Hoop	0·06
Montagu	0·22
Danger Point	1·30
Vygebooms River	0·84
Elgin Plantation	2·12
Elsenberg Agricultural College	2·78
Berg River Hoek	...
Wemmer's Hoek	...
Roskeen	0·94
Vruchtbaar	1·70

III. WEST COAST:

	INS.
Port Nolloth	0·00
Do. (Lieut. Barber)	0·00
Anenous	0·10
Klipfontein	0·04
Kraaifontein	0·04
O'okiep	...
Springbokfontein	0·00
Concordia	...
Do. (Kraphol)	0·11
Garies	0·07
Lilyfontein	...
Van Rhyn's Dorp	0·00
Clanwilliam Gaol	0·11
Do. (Downes)	...
Dassen Island	0·54
Kersefontein	0·32
The Towers	0·42
Abbotsdale	...
Malmesbury	0·95
Piquetberg	0·70
Zoutpan	...
Wupperthal	0·00
Welbedacht	...
Hopefield	0·38

IV. SOUTH COAST:

	INS.
Cape Agulhas	0·58
Bredasdorp	0·29
Swellendam	0·43
Potberg	...
Zuurbraak	1·06
Grootvaders Bosch	0·60
Heidelberg	0·21
Riversdale	0·85
Melkhoutfontein	...
Vogel Vlei	0·55
Geelbek's Vlei	...
Mossel Bay	0·78
Great Brak River	0·50
George	...
Do. (Plantation)	1·88
Do. (Woodifield)	2·69
Ezeljagt	0·32
Millwood	...

IV. SOUTH COAST (*con.*) :

	INS.
Sourflats	
Concordia	
Knysna	2·02
Buffel's Nek	1·76
Plettenberg Bay	1·85
Harkerville	
Forest Hall	
Blaauwkrantz	1·84
Lottering	1·53
Storm's River	1·69
Witte Els Bosch	1·58
Humansdorp	0·70
Cape St. Francis	1·12
Hankey	
Witteklip, Sunnyside	0·49
Van Staden's, Intake	0·40
Do. On Hill	0·50
Kruis River	
Uitenhage, Gaol	0·20
Do. (Park)	0·22
Do. (Ingge)	
Armadale, Blue Cliff	0·67
Dunbrody	0·46
Port Elizabeth (Harbour)	0·31
Do. (Victoria Park)	
Do. (Walmer Heights)	0·53
Shark's River (Nursery)	0·61
Do. (Convict Station)	0·53
Tankatara	
Centlivres	0·19

V. SOUTHERN KAROO :

	INS.
Verkeerde Vlei	
Bok River	
Triangle	
Touws River	
Do. (D.E. Office)	
Pietermeintjes	
Grootfontein	
Ladismith	2·01
Amalienstein	0·63
Seven Weeks' Poort	
Calitzdorp	0.20
Oudtshoorn	0·80
Vlakte Plaats	
Uniondale	0 55
Kleinpoort	0·00
Glenconnor	
Rust en Vrede	

VI. WEST-CENTRAL KAROO :

	INS.
Matjesfontein	
Laingsburg	
Prince Albert Road	0·00
Fraserburg Road	
Prince Albert	0·11
Zwartberg Pass	0·60
Booi's Kraal, Beaufort West	
Beaufort West, Gaol	0·24
Dunedin	0·18
Nel's Poort	0·05
Camfers Kraal	0·00
Lower Nel's Poort	
Krom River	0·03
Baaken's Rug	
Willowmore	0·07
Rietfontein	
Steytlerville	0·15
Lemoenfontein, Beaufort West	1·44

VII. EAST-CENTRAL KAROO :

	INS.
Buffels Kloof	0·56
Aberdeen, Gaol	0·25
Do. Bedford	
Corndale	0·15
Aberdeen Road	
Klipplaat	
Winterhoek	0·42
Klipdrift	0·22
Kendrew, Holmes	0·29
Do	0·30
Graaff-Reinet, Gaol	0·58
Do. (Eng. Yard)	0·60
Do. (College)	
New Bethesda	0·48
Roodebloem	0·81
Glen Harry	1·33
Wellwood	0·84
Do. Mountain	
Bloemhof	0·52
Jansenville	0·18
Patrysfontein	
Bethesda Road	
Afrikander's Kloof	
Roode Hoogte	0·55
Toegedacht	0·29
Klipfontein	0·57
Cranemere	
Pearston	1·28
Darlington	
Walsingham	
Arundale	
Doornbosch, Zwagershoek	
Middlewater	0·76
Somerset East, Gaol	1·18
Do. Do. College	
Longhope	
Cookhouse	1·04
Middleton	0·98
Spitzkop, Graaff-Reinet	1·07
Bruintjes Hoogte	1·04
Grobbelaars Kraal	0·49

VIII. NORTHERN KAROO :

	INS.
Calvinia	0·10
Middlepost	
Brandvlei	
Onderste Doorns	
Sutherland	0·18
Fraserburg	0·12
Scorpions Drift	
Rheboksfontein	
Klein Vlei	
Carnarvon	0·07
Loxton	
Beyersfontein	
Wagenaars Kraal	
Brakfontein	0·05
Victoria West	0·15
Omdraais Vlei	
Doornkuilen	
Britstown	0·19
Wildebeestkooij	
Murraysburg	0·56
De Kruis, Murraysburg	0·83
Richmond	0·56
De Aar	
Middlemount	
Hanover	0·27
Theefontein	0·36
Zwagersfontein	

VIII. NORTHERN KAROO (*con.*):	INS.
Philipstown	0·25
Boschfontein	
Petrusville	0·41
The Willows, Middelburg ...	
Naauwpoort	
Middelburg, Gaol	0·45
Do.	
Middelburg, Government Farm	
Jackalsfontein	0·58
Ezelpoort	0·67
Plaatberg	0·51
Grape Vale	
Ezelfontein	
Roodepoort	
Groenkloof	
Vlakfontein	0·63
Vogelsfontein	
Plaatfontein	
Colesberg	0·40
Tafelberg Hall	
Rietbult (Colesberg Bridge) ...	
Fish River	
Varkens Kop	0·40
Culmstock	
Droogefontein	
Stonehills	
Cradock, Gaol	0·95
Witmoss	0·95
Varsch Vlei	
Maraisburg	0·74
Steynsburg, Gaol	0·44
Riet Vlei	
Hillmoor	0·52
Quagga's Kerk	
Tarkastad	0·93
Do. (Dis. Engineer) ...	0·46
Drummond Park	0·40
Glen Roy	
Waverley	0·39
Gannapan	
Montagu...	
Grape Vale	
Rietfontein, Cradock ...	
Schuilhoek	0·36
Vosburg	0·07
Zwavelfontein	
Holle River, Colesberg ...	
The Meadows, Schoombie ...	
Hartebeestefontein, Steynsburg .	0·35
Rietfontein, Colesberg ...	1·34
IX. NORTHERN BORDER:	
Pella	0·00
The Halt	0·06
Keimoes	
Kenhardt	0·14
Upington	0·05
Trooilapspan	0·00
Van Wyk's Vlei	0·14
Prieska	
New Year's Kraal	0·00
Dunmurry	0·09
Karree Kloof	0·00
Griquatown	
Campbell	
Douglas	0·05
Avoca, Herbert	
Hope Town	0·28
Orange River	
Newlands, Barkly West ...	
Barkly West	0·11

IX. NORTHERN BORDER (*con.*):	INS.
Bellsbank	
Kimberley Gaol	0·20
Do. Stephens ...	0·23
Strydenburg	
Douglas (Vos)	0·05
X. SOUTH EAST:	
Melrose (Div. Bedford) ...	1·21
Dagga Boer	1·39
Fairholt	1·41
Lynedoch	
Alicedale	
Cheviot Fells	1·67
Bedford, Gaol	1·57
Do. (Hall)	
Sydney's Hope	1·03
Cullendale	
Adelaide...	1·28
Atherstone	0·95
Alexandria	0·99
Salem	0·55
Fort Fordyce	1·02
Fountain Head	
Graham's Town, Gaol ...	0·81
Do. Do.	
Heatherton Towers	0·57
Sunnyside	0·68
Vischgat...	
Fort Beaufort	0·97
Katberg	1·05
Balfour	0·60
Seymour...	0·79
Glencairn	2·49
Alice	1·18
Lovedale...	0·86
Port Alfred	1·08
Hogsback	1·58
Peddie	0·37
Exwell Park	0·57
Keiskamma Hoek	0·86
Cathcart, Gaol	0·90
Cathcart (Foreman)	0·80
Cathcart...	0·94
Thaba N'doda	1·02
Evelyn Valley	1·47
Crawley	0·59
Thomas River	0·30
Perie Forest	1·13
Forestbourne	1·24
Isidenge	0·91
Kologha	1·06
King William's Town, Gaol ...	0·45
Do. Do. Dr. Egan	0·60
Stutterheim, Wylde... ...	
Do. Besté	0·67
Fort Cunynghame	0·82
Dohne	0·00
Kubusie	0·85
Quacu	0·67
Blaney	
Kei Road	1·05
Berlin	0·00
Bolo	0·66
Fort Jackson	0·00
Prospect Farm, Komgha ...	0·55
Komgha, Gaol	0·44
Chiselhurst	0·44
East London West	0·22
East London East	0·70
Cata	0·87
Wolf Ridge	1·27

X. SOUTH-EAST (*continued*):

	INS.
Dontsah ...	0·95
Mount Coke	0·25
Blackwoods	1·39
Albert Vale, near Bedford	1·11
Heatherton (Irrigation)	0·64
Huxley Farm, Stutterheim	0·72
Amabele ...	0·80

XI. NORTH-EAST:

	INS.
Venterstad	0·48
Mooifontein	0·60
Burnley, Cyphergat ...	
Burghersdorp Gaol	0·37
Ellesmere	0·17
Molteno ...	0·67
Lyndene ...	
Cyphergat	0·98
Thibet Park	0·69
Sterkstroom Station	0·73
Do. Gaol	0·62
Rocklands	0·37
Aliwal North Gaol	0·27
Do. Brown	
Do. Dist. Engineer	0·25
Buffelsfontein	0·75
Hex's Plantation	
Poplar Grove	
Carnarvon Farm	0·91
Halseton ...	0·82
Jamestown	0·35
Whittlesea	0·76
Queenstown Gaol	0·24
Do. Beswick	0·79
Rietfontein, Aliwal North	0·34
Middlecourt	0·78
Dordrecht	0·74
Tylden ...	0·66
Nooitgedacht	
Herschel ...	0·71
Lady Grey	0·58
Lauriston	0·39
Lady Frere	0·67
Contest, near Bolotwa	0·89
Sterkspruit	
Doornkop	
Avoca, Barkly East ...	
Keilands ...	0·61
Palmietfontein	
Barkly East	0·29
Blikana ...	0·43
Glenlyon ...	
Rhodes ...	
Gateshead	
Cliftonvale	
Albert Junction	0·23
Queenstown (District Engineer's Office)	0·80
Hughenden	
Glenwallace	0·95
Indwe (District Engineer's Office)	0·59
Bensonvale Inst., Herschel	
Cathcart, Queenstown	
Royal, Div. Albert ...	
Lady Grey Station ...	0·63
Dordrecht (D.E.)	1·27
Stormberg Junction	0·74
Broughton, Molteno ...	0·90
Hopewell, Imvani ...	0·94
Sunny Mead	0·65
Castle Hill	0·35

XII. KAFFRARIA:

	INS.
Ida, Xalanga	0·59
Slaate, Xalanga	0·61
Cofimvaba	0·50
Tsomo ...	0·39
N'qamakwe	0·88
Main ...	0·57
Engcobo ...	0·79
Butterworth	0·49
Woodcliff	0·53
Kentani ...	0·60
Maclear ...	
Idutywa ...	0·54
Bazeya ...	0·75
Willowvale	0·37
Mount Fletsher	0·00
Somerville, Tsolo	0·19
Elliotdale	0·48
M'quanduli	
Matatiele	
Umtata ...	0·22
Cwebe ...	0·00
Tabankulu	0·32
Mount Ayliff	0·29
Kokstad ...	0·22
Do., The Willows	0·22
Seteba ...	0·00
Flagstaff ...	0·14
Insikeni ...	0·02
Port St. John's	0·06
Kilrush, Sneezewood	
Umzimkulu	0·08
Mandileni	
Wanstead	
Cedarville	
Maclear Station	0·32
Elliot Station	0·34
Tent Kop, Elands Height	0·48
Umzimkulu (Strachan)	0·07
Waterfall Farm, Kokstad	0·08
Confluence, Matatiele	0·00

XIII. BASUTOLAND:

	INS.
Mafeking	
Mohalies Hoek	0·61
Maseru ...	0·22
Teyateyaneng, Berea	0·13
Moyeni Quthing	
Qacha's Nek	0·20
Leribe ...	
Butha Buthe	

XIV. ORANGE RIVER COLONY:

	INS.
Bloemfontein	

XV. NATAL:

	INS.
Durban, Observatory	0·37

XVI. TRANSVAAL:

	INS.
Johannesburg	

XVII. BECHUANALAND:

	INS.
Taungs ...	0·00
Vryburg ...	0·00
Mafeking	0·00
Setlagoli ...	
Kuruman	0·00
Zwartlaagte	
Armadillo Creek, Vryburg	0·00

XVIII. RHODESIA:

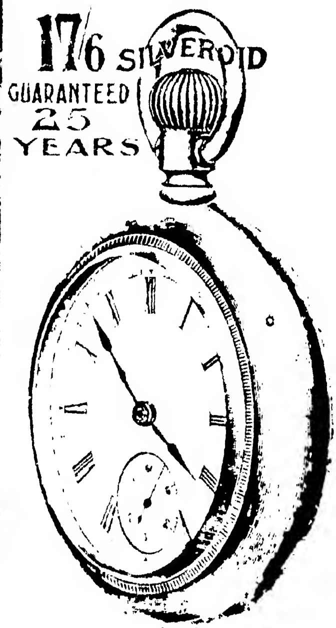
	INS.
Hopefountain	0·02
Rhodes Matoppo Park	0·11

XIX. DAMARALAND:

	INS.
Walfish Bay	

MENDELSOHN'S

THE LARGEST and CHEAPEST HOUSE for JEWELLERY and WATCHES in SOUTH AFRICA.



MENDELSOHN'S FAMOUS WATCH for FARMERS

AND OTHERS REQUIRING

A WATCH for ROUGH WORK.

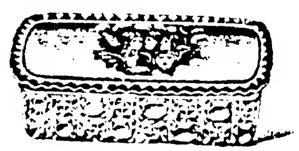
As Illustrated. Damp and Dust proof Screw case.

SILVEROID (with written guarantee for 25 years) **17/6**

STERLING SILVER (do. do.) **42/-**

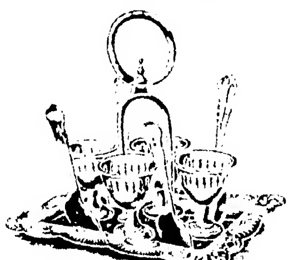
(Post Free to any Address in South Africa.)

MENDELSOHN'S to prove the Reliability and Sterling Value of this Watch will send you one on
30 DAYS' FREE TRIAL.
WRITE FOR ILLUSTRATED CATALOGUE!
It Costs you Nothing and will Save you Pounds.



C 434. Silver Mounted Pin Boxes.
5/6 7/6 8/6 10/6 12/6 15/-

17/6 with a Guarantee for 25 Years **17/6**
Cheaper quality **12/6**



C 43-
18 ct. Gold, set 3 Rubies and 4 Diamonds, **45/-**

C 441
18ct. Gold, set Diamonds and Gems, **25/-**

C 417
Diamond and Ruby or Sapphire Half Hoop
£10 £12 10 - £15 £17 10 - £20

C 414
Half Hoop Diamond Ring
£20
Other Prices,
£5 £6 6 - £7 10 - £10 £12 10 - £15

Electro-Silver Egg Stands
4 Cup **17/6 20/- 25/- 30/-**
6 Cup **25/- 30/- 40/-**

I. MENDELSOHN & CO.,

WHOLESALE AND RETAIL JEWELLERS & WATCH MANUFACTURERS.

73, BURG ST., CAPETOWN (2 Doors from Central Fire Station).

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 20th June, 1908, ruling at the several centres named, is published for general information.

Centre.	A. Wheat per 100 lbs.	B. Wheat Flour per 100 lbs.	C. Boer Meal per 100 lbs.	D. Mealies per 100 lbs.	E. Mealie Meal per 100 lbs.	F. Barley per 100 lbs.	G. Oats per 100 lbs.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Aliwal North ..	0 9 0	0 11 6	0 12 0	0 6 6	0 7 6	0 7 3	0 10 0
Beaufort West ..	0 12 6	1 0 0	0 14 6	0 7 9	0 10 0	0 9 0	0 9 0
Burghersdorp ..	0 9 9	0 17 6	1 5 0	0 6 6	0 16 6	0 5 0	0 15 0
Cape Town ..	..	..	..	..	..	0 6 6	0 6 6
Clanwilliam ..	0 13 0	..	0 14 0	0 8 6	..	..	0 8 0
Colesberg ..	1 3 0	..	..	..	..	0 11 3	..
Cradock ..	0 11 0	..	0 12 6	0 6 6	..	0 9 3	0 7 6
Dordrecht ..	0 8 6	0 13 9	0 12 6	0 7 9	0 9 0	0 8 6	0 10 0
East London ..	0 11 0	0 14 0	0 12 0	0 6 9	0 16 6	0 6 0	0 9 0
Graaff-Reinet ..	0 10 0	..	..	0 6 0	..	0 6 0	..
Grahamstown ..	0 12 6	..	..	0 7 9	..	0 7 9	0 8 3
Kimberley ..	0 9 3	0 16 0	0 13 9	0 4 3	0 5 9	0 6 0	0 7 0
King William's Tn. ..	0 10 0	0 17 0	0 14 0	0 6 6	0 8 0	0 6 0	0 6 0
Malmesbury ..	0 10 0	0 13 6	0 12 0	0 10 0	..	0 7 0	0 6 0
Mossel Bay ..	0 14 6	0 17 6	0 16 0	0 8 0	0 9 0	0 7 6	..
Port Alfred ..	0 12 0	0 18 0	0 16 0	0 7 6	0 14 0	0 10 0	0 10 0
Port Elizabeth ..	..	..	..	0 6 9	..	0 7 0	0 8 0
Queenstown ..	0 10 0	0 15 6	0 13 0	0 6 0	0 7 6	0 7 0	0 9 0
Tarkastad ..	0 14 0	0 10 6	0 16 6	0 8 0	0 10 0	0 8 0	0 8 6
Vryburg ..	0 15 0	1 2 0	0 16 0	0 8 0	0 9 0	0 5 6	0 5 0
Worcester ..	0 10 6	0 16 0	0 12 0	0 8 0	0 9 0	0 8 0	0 7 0

Centre.	H. Oat-hay per 100 lbs.	J. Potatoes per 100 lbs.	K. Tobacco (Boer Roll) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		
Aliwal North ..	0 6 6	0 10 0	1/6 to 2/-	0 0 6	0 0 6	1/3 to 1/6	0 2 6	£6 10s to £9 5s	12/6 to 15/-
Beaufort West ..	0 5 6	0 9 6	0 0 7	4d. to 11d.*	4d. to 6d.*	0 1 9	0 2 6	£9	16/-
Burghersdorp ..	0 6 6	0 7 0	0 0 5	0 0 6½	0 0 4½	0 1 6	0 2 0	..	..
Cape Town ..	0 3 6	14/- & 15/- pr. 150 lbs.	..	..	..	0 1 3	10/- to 11/-	..	..
Clanwilliam ..	..	0 9 0	0 1 0	0 0 7	6d. to 7d.	0 1 3	0 1 3	..	..
Colesberg ..	0 6 1	0 9 6	..	..	..	1/3 to 1/5	2/- to 2/2	..	..
Cradock ..	0 6 6	0 7 0	0 0 9	..	0 0 4	0 2 0	0 2 3	£9	15/-
Dordrecht ..	0 5 3	0 5 6	0 1 9	0 0 3½	0 0 3	0 2 0	0 1 9	£8	14/-
East London ..	0 5 0	0 7 6	0 1 0	0 0 4	0 0 5	0 1 10	0 1 9	£10	19/-
Graaff-Reinet ..	0 6 0	0 8 0	0 0 3	0 0 5	0 0 5	0 2 0	0 2 0	£10	12/6
Grahamstown ..	0 6 0	0 10 6	0 0 9	0 0 5	0 0 6½	0 1 7	0 1 9	..	..
Kimberley ..	0 5 0	0 12 6	0 0 5	0 0 7	0 0 6	..	0 1 5	£8 10s.	11/9
King William's Tn. ..	0 5 6	0 8 6	0 0 3½	0 0 4	0 0 5	0 2 0	0 1 4	£12 2s. 6d.	21/-
Malmesbury ..	0 3 0	0 10 0	0 1 0	0 0 6	0 0 6	0 1 4	0 1 6	£12 10s.	22/6
Mossel Bay ..	0 4 6	0 8 6	..	0 0 7	0 0 7	0 1 6	0 1 3	..	..
Port Alfred ..	0 5 0	0 8 0	0 0 9	0 0 6	0 0 6	0 2 0	0 1 0	..	..
Port Elizabeth ..	0 5 3	0 12 9	0 0 3½	0 0 7	0 0 7	0 1 8	0 2 2	..	..
Queenstown ..	0 5 0	0 6 6	0 0 7	0 0 6	0 0 4	0 1 6	0 1 6	£12 to £14	18/- to 22/-
Tarkastad ..	0 7 6	0 8 6	0 1 0	0 0 1*	0 0 4*	0 1 6	0 2 9	£10	20/-
Vryburg ..	0 3 0	0 5 0	0 0 6	*5d. to 9d. †5d. to 9d.	*5d. to 6d. †5d. to 6d.	0 1 6	0 1 6	£7 8s.	12/6 to 14/-
Worcester ..	0 3 3	0 8 0	0 0 5	4d. to 9d.	5d. to 6d.	0 1 6	0 1 6	£7 to £12	18/- to 22/6

NOTE.—A blank space denotes "no transactions." * Colonial. † Frozen.

PRODUCE MARKETS.

PORT ELIZABETH.

Messrs. John Daverin and Co. report under date June 26 :—

Ostrich Feathers.—The market was again fully supplied this week with a fair average assortment. Competition was keen for all super qualities, and high prices were obtained, but in common sorts there was no improvement, sales being made with difficulty. The total quantity sold amounted to £13,245 16s. 11d., and weighed 6,019 lbs. 11¼ ozs. A moderate business has been done out of hand in parcels of good quality.

	£ s. d.		£ s. d.
Primes : Extra Super	Special Prices.		
Good to Super ...	14 0 0	to	25 0 0
Whites : Firsts ...	9 0 0	„	14 0 0
Seconds ...	5 0 0	„	7 10 0
Thirds ...	0 15 0	„	3 0 0
Feminas : Super ...	9 0 0	„	15 0 0
Firsts ...	6 10 0	„	8 10 0
Seconds ...	3 10 0	„	6 10 0
Thirds ...	0 10 0	„	2 0 0
Greys ...	1 10 0	„	6 10 0
Fancy	4 0 0	„	8 0 0
Tails : White	0 12 6	„	2 10 0
Light	0 10 0	„	1 15 0
Coloured & Dark	0 1 0	„	0 15 0

	£ s. d.		£ s. d.
Blacks : Long ...	2 10 0	to	5 10 0
Medium ...	1 0 0	„	3 0 0
Short ...	0 5 0	„	1 0 0
Wirey ...	0 0 3	„	0 0 6
Floss ...	0 5 0	„	1 10 0
Drabs : Long... ...	1 0 0	„	3 0 0
Medium ...	0 12 6	„	1 10 0
Short... ...	0 2 6	„	0 6 0
Wirey ...	0 0 3	„	0 0 6
Floss... ...	0 5 0	„	1 10 0
Spadonas : Light ...	0 10 0	„	3 0 0
Dark ...	0 5 0	„	1 15 0
Chicks...	0 0 3	„	0 2 6

Wool.—This market continues firm, but the amount of business being done in the open market is only small, owners still refusing to accept current prices, hoping for further improvement. On the public market yesterday a small quantity was offered, and prices showed no change as compared with last week's market.

Snowwhite, Extra Superior ...	17d	to	17¼d
Do. Superior	16d	„	16½d
Do. Good to Superior...	15d	„	15½d
Do. Inferior Faulty ...	13d	„	14d
Grease, Super Long, well-conditioned, Grassveldt grown (special clips) ...	6½d	„	7d
Do. do. do. ...	3½d	„	6d
Do. do. Karoo grown (special clips)	5½d	„	5d
Do. do. do. ...	4¾d	„	5d
Do. do. Mixed Veldt...	5d	„	5½d
Do. Light, faultless, medium Grassveldt grown ...	5d	„	5½d
Do. do. Karoo grown	4½d	„	5d
Do. do. short, do.	4d	„	4½d
Grease, Coarse and Coloured ...	1d	to	2¾d
Scoured do. do. ...	2d	„	9½d
Basuto Grease, short	5d	„	5d
O.R.C. Grassveldt Grease, long & well-conditioned (special clips)	5½d	„	6d
Do. do. do. ...	4½d	„	5d
Do. do. medium grown, light, with little fault	4½d	„	4¾d
Do. do. short, faulty & wasty	¾d	„	4d
Do. do. Karoo grown, long & well-conditioned ...	4½d	„	4¾d
Do. do. medium grown, light with little fault ...	3½d	„	4d
Do. do. short, faulty and wasty...	3½d	„	3½d

Mohair.—This market remains very quiet, and only a limited amount of business has been done in the open market during the week, at about 8½d. for First and 15d. for Kids, some small special clips fetching rather higher prices. On Tuesday's public market a fairly large quantity was offered to very dull competition, the bulk being withdrawn at low bids.

Super Kids	**15d to 16d**	**Mixed O.R.C. Hair (average)**	**6¾d to 7½d**
Ordinary Kids and Stained ...	**12d „ 13d**	**Do. very mixed**	**6d „ 6½d**
Superior Firsts, special clips	**9d „ 9d**	**Seconds and Grey ...**	**5d „ 6d**
Ordinary Firsts...	**7½d „ 8½d**	**Thirds ... ...**	**3d „ 3d**
Short Firsts and Stained ...	**7d „ 7d**	**Winter Kids, special clips**	**.none offering**
Superfine Long Blue O.R.C. Hair	**8d „ 8½d**	**Do. good ordinary**	**.none offering**
		Winter Hair	**.none offering**
		Basuto Hair (nominal)	**8d to 8½d**

Skins.—Sheepskins in bundles, 4⅛d.; Pelts, 2½d. per lb.; Capes, 12d.; damaged, 4d. each; Goatskins, 9½d.; damaged, 4d. per lb.; Angoras, 4½d.; Shorn, 3d.; damaged, 2d. per lb.; Springbok, 8d. per lb.; Johannesburg Goat, 8d.; Angora, 4d.

Hides.—Sundried, 6d.; damaged, 5d.; Salted, 5d.; damaged, 4d.; Madagascar Hides, 4d.; damaged 3d.

Horns.—3½d. each all round.

CAPE TOWN.

Mr. R. Müller, of Strand Street (Produce Department), reports for the month ending June 30:—

Ostrich Feathers.—The London Sales closed on the 4th of June, the total amount offered being 89,160 lbs., which realised £200,000. Best Whites, Feminas and Spadonas were 10 per cent. lower, Blacks were from 10 per cent. to 15 per cent. dearer, while Drabs remained firm. Locally, only the best quality is in demand. Narrow Feathers and Common Spadonas are almost unsaleable.

	£	s.	d.	£	s.	d.
Super Primes ...	15	0	0	35	0	0
First, ordinary to Super	10	0	0	14	0	0
Seconds	5	0	0	8	0	0
Thirds...	3	0	0	4	0	0
Femina Super ...	10	0	0	16	0	0
Do., Seconds to Firsts	3	10	0	9	0	0
Byocks (Fancy) ...	5	0	0	9	0	0
Long Blacks	3	10	0	7	0	0
Medium Blacks ...	2	5	0	3	0	0
Short to Medium ...	0	10	0	1	15	0
Floss	0	5	0	1	10	0
Long Drabs	2	0	0	3	10	0
Medium Drabs ...	1	0	0	1	10	0
Short to Medium ...	0	5	0	1	0	0
Floss	0	5	0	1	10	0
White Tails	1	10	0	2	10	0
Coloured Tails ...	0	15	0	1	5	0
Chicks...	0	1	0	0	2	0
Spadonas	2	0	0	3	0	0
Inferior Black and Drabs, short to long	0	0	6	1	10	0

Wool.—The market remains firm, but the turn over has not been large, holders' limits being higher in most cases, than buyers are prepared to give. Several parcels of good light Karoo Wool were offered, most of which found buyers at from 5¾d. to 6¼d. Calvinia Wools generally were light of condition, prices ranging from 4¾d. to 5¼d. Malmesbury lots were of poor quality, many lots being burry. There is no demand for such Wools. Snow Whites are in fair demand, Extra Supers may be quoted from 16d. to 17½d., Ordinary from 1s. to 1s. 2d.

	s.	d.	s.	d.
Super long Grass Veld ...	0	7	0	7½
Do. Karoo	0	5½	0	6¾
Medium	0	4	0	4¾
Short and inferior	0	3½	0	4
Wool for Washing	0	5	0	6
Snow-white Super to Extra	1	4	1	7
Do. Ordinary ...	1	1	1	4
Fleece Washed	0	0	0	8

***Mohair.*—The market remains quiet. A few lots of Firsts were sold, the average price being 8d. for well-sorted lots; mixed lots from 6¾d. to 7½d.** There is a limited

enquiry for Super Kids, but holders do not seem disposed to accept the prices bid, being of opinion that the market will improve shortly.

	s.	d.	s.	d.		s.	d.	s.	d.
Firsts, Summer	0	8	0	9	Winter	0	6	0	7½
Kids	1	0	1	4	Do. Kids...	0	11	1	0
Seconds	0	5½	0	6					

Skins and Hides.—There is a good demand for all classes. Capes and Merino Skins are from par to farthing higher. The London Sales for Goat Skins took place on the 25th of last month. All classes were from par to farthing lower, except *Extra Lights*, which were firm and occasionally advanced a farthing.

	s.	d.	s.	d.		s.	d.	s.	d.
Long wooled Skins... ...	0	4	0	4¼	Goat, heavy to light ...	0	7¼	0	10
Short...	0	3	0	3¼	Sundried	0	0	0	5
Shorn	0	0	0	2¾	Angoras	0	0	0	4
Bastards	0	0	0	2¾	Sundried Hides	0	5	0	5½
Cape Skins, each	1	4	1	8	Salted	0	4	0	5
Do., cut, each ...	0	0	0	9	Wet...	0	3	0	3½

MILK RECORD.

ELSENBURG COLLEGE HERD.

Subjoined is the Milk Record to the 30th June, 1908 :—

Breed and Cows.	Days in Milk.	Yield in Lbs.		
		During June.	Total to date.	Daily Average.
FRIESLANDS.				
Romula	106	749	3,732	35·2
Victoria	96	904	3,116	32·5
Rose	301	252	8,318	27·6
Bell	307	16	6,434	21
Cleopatra	131	1,182	6,093	46·5
Daisy	109	299	1,605	14·7
JERSEYS.				
Gertie	12	291	291	24·2
Gilliflower	304	253	6,693	22
*Fuchsia...	301	66	5,116	17
	10	151	151	15·1
Gladys	50	683	1,142	22·8
Gwendolen	300	218	5,716	19
Grace	316	179	4,630	14·6
Nora	151	141	2,844	18·8
AYRSHIRES.				
Cherry	33	1,134	1,249	37·8
Lobelia...	8	248	248	31
CROSSES.				
Bessie	231	769	8,200	35·5
Disa	106	637	2,591	24·4

* Fuchsia calved during June.

APPLICATIONS FOR AGRICULTURAL EMPLOYMENT.

J. van der Merwe, 11 Hopeville Street, Cape Town, 19 years of age, seeks employment on farm in Eastern Province. Has some knowledge of farming and wants further experience. Wishing to make himself generally useful.*

Young Englishman, age 27, is desirous of learning farming in the Colony, in any of its branches. Unmarried healthy, strong and willing to work. Willing to serve for his Board and Lodging. Reply S. J. REEVES, 149, Southgate Road, Islington, London, N.

ANIMAL DISEASES—CONTAGIOUS AND INFECTIOUS.

Summary of Outbreaks of Contagious and Infectious Animal Diseases Scheduled under Act No. 27 of 1893, and still under Quarantine on 31st May, 1908.

DISTRICT.	Anthrax.	Epizootic Lymphangitis.	Glanders.	Lungsickness.	Redwater.	Scabies (Equine.)	Sponsziekte.	Tuberculosis.	Totals.
Albert	...	...	...	...	...	...	1	...	1
East London	...	1	...	6	...	...	1	...	8
Fort Beaufort	...	...	...	...	1	...	...	...	1
Gordonia	...	...	...	7	...	...	...	...	7
Herschel	...	...	...	...	...	...	4	...	4
Humansdorp	...	2	...	...	6	3	...	...	11
Kenhardt	...	...	...	1	...	...	...	...	1
King William's Town	...	...	...	3	...	...	3	...	6
Komgha	...	...	...	6	...	1	...	...	7
Peddie	...	...	...	1	...	...	...	...	1
Port Nolloth	...	...	...	1	...	...	...	...	1
Stellenbosch	...	...	...	...	...	...	...	1	1
Stockenstrom	...	...	...	1	...	...	...	...	1
Tulbagh	...	...	1	...	...	...	...	...	1
Vryburg	1	...	...	...	...	...	...	...	1
NATIVE TERRITORIES.									
Tembuland.									
Elliotdale	...	...	...	1	...	...	...	...	1
Engcobo	...	...	...	20	...	...	1	...	21
Mqanduli	...	...	...	23	...	...	...	...	23
St. Mark's	1	...	1	4	18	...	6	...	30
Umtata	...	...	...	35	...	...	...	...	35
Transkei.									
Butterworth	...	...	...	6	...	...	...	...	6
Kentani	3	...	...	22	...	...	1	...	26
Nqamakwe	...	...	...	12	1	...	...	...	13
Tsomo	...	...	...	8	3	...	...	...	11
Willowvale	...	...	...	8	...	...	...	...	8
Pondoland.									
Libode	...	...	...	2	...	...	...	...	2
Lusikisiki	...	...	...	5	...	...	1	...	6
Ngqeleni	...	...	...	13	...	...	...	...	13
Tabankulu	...	...	...	24	...	...	...	...	24
East Griqualand.									
Mount Frere	...	...	...	10	...	...	...	...	10
Qumbu	...	...	...	27	...	...	...	...	27
Tsolo	...	...	...	37	...	...	...	...	37
Totals ...	5	3	2	283	29	4	18	1	345

J. D. BORTHWICK, Chief Veterinary Surgeon.

Department of Agriculture,
Cape Town, 29th June, 1908.

F

FRUIT EXPORT.

Return of Fruit Shipped from Cape Colony during May, 1908.

Port of Shipment.	Destination.	No. of Packages.	Description of Fruit.	Quantities.	Value. £	s.	d.
Cape Town ...	England	32	Apples ...	3,200	6	17	6
" ...	German South West Africa	4	Naartjes ...	800	1	12	0
" ...	"	1	Grapes ...	*30	0	10	0
" ...	"	1	Pineapples ...	100	1	0	0
" ...	"	8	Bananas ...	3,950	7	15	0
" ...	"	9	Lemons ...	3,650	7	3	0
" ...	"	38	Pears ...	3,200	14	15	0
" ...	"	119	Apples ...	13,600	55	0	0
" ...	"	111	Oranges ...	9,580	30	5	0
" ...	Mauritius	134	Apples ...	3,000	15	0	0
" ...	"	95	Pears ...	2,580	12	15	0
" ...	"	35	Naartjes ...	2,000	6	3	1
" ...	"	45	Oranges ...	4,500	11	12	0
" ...	Portuguese East Africa	50	Apples ...	1,500	7	10	0
" ...	"	50	Pears ...	1,500	7	10	0
" ...	St. Helena ...	1	Pears ...	18	0	5	0
" ...	"	1	Apples ...	100	0	12	6
" ...	"	1	Naartjes ...	36	0	3	0
" ...	"	1	Oranges ...	50	0	4	0
" ...	"	1	Bananas ...	50	0	2	6
Port Elizabeth	England	188	Pineapples ...	3,915	18	0	0

Figures marked * denotes weight in lbs.

BREEDERS' DIRECTORY & FARMING NOTICES.

Advertisements under this heading are inserted at the rate of 30 words for 2s. 6d., (minimum charge) per insertion, and 6d. per line of approximately six words above that number. Payment must accompany Order. Cheques and P.O.O. to be made payable to the CENTRAL NEWS AGENCY 125-127, Long Street, Cape Town, to whom all communications should be addressed.

OSTRICHES.

SPECIALS ONLY.—Choice pairs, 2 years' old, £60 to £100 per pair. Younger birds at lower prices. — F. W. BAKER, Laughing Waters, Willowmore.

PIGS.

PURE BRED BERKSHIRE PIGS.—Prize Winning Stock. Boars and Sows, £3 each. Also Buff Orpington and White Leghorn Poultry. —Apply MANAGER, Maitland River Farm, Green Bushes Hotel, Port Elizabeth.

GENERAL.

PASPALUM GRASS PLANTS.—Strong roots per Rail or smaller plants per Post to any address. See larger advertisement, page ix. this Journal.—A. C. BULLER, Dwarsriviers Hoek, Stellenbosch.

THE POULTRY YARD.

WHITE LEGHORNS.—Best American Utility Strains. Settings of Eggs for sale, from pure-bred utility White Leghorns, F.O.R., 10/6 per setting of 15. Cockerels, 10/- to 20/-. Terms, cash with order. Mrs. W. L. STEEL, Stellenbosch.

BUFF ORPINGTONS, SILVER WYANDOTTES, BLACK MINORCAS. Winners of over 90 prizes. Bred for Utility and Show points. Prices from 30/-. COCKERELS from 10/-. Will improve the table and laying qualities of common fowls. Mrs. R. F. DOTT, Kenilworth, Kimberley.

UTILITY AND EXHIBITION Buff Leghorns, Buff Orpingtons, and Houdans. American Utility White Leg and Brown Leg. Cockerels from 10/6, Pullets from 7/6: Eggs 10/6 per setting, unfertiles replaced if returned; day old Chicks from above 18/- per doz. FIRST CROSSES—Houdan-Buff Orpingtons, Houdan-Leghorns, Leghorns-B. Orpington—Eggs 6/- per setting, day old Chicks 10/- per doz. Orders are now being booked for Chicks and Eggs. All Eggs and Birds are packed and put on rail free. Birds not approved of can be returned. All stock is open for inspection at all reasonable times, and this is invited. Cart will meet train upon advice from intending buyers. Terms: Cash with Order.—CARTER & MOLE, Breeders of Utility and Fancy Poultry, Craigneich Poultry Farm, Stellenbosch.

Hazell, Rondebosch. PRIZE POULTRY.—Andalusian White Wyandottes, Brown Leghorns and Rocks. Stock and Sittings for Sale. Inspection and Correspondence invited, R. HAZELL, Tregenna, Park Road Rondebosch.

WRIGHT BROS., Highlands, Cape, Breeders of Black and Buff Orpingtons, White and Partridge Wyandottes, Black Langshans and Champion Laying WHITE LEGHORNS. Birds for Sale from 10/6 up. Terms Cash. Birds not approved may be returned. Please Note 400 Birds to select your wants from. Please mention this paper.

BUFF ORPINGTONS. — THE FARMER'S FOWL. The fowl that LAYS WHEN EGGS ARE TOP PRICE. A 1 TABLE BIRDS. My Buffs have unlimited orchard and grass run, and are noted for hardiness and good laying qualities. Young stock always for sale at very reasonable prices. Ask for inclusive quotations; carriage paid to any station in South Africa and AT MY RISK to rail destination. My list of prizes won at shows all over South Africa will convince you that this unrivalled *Colonial* strain of 10 years' standing CAN HOLD ITS OWN AGAINST IMPORTED STOCK. Buy hardy Colonial-bred birds and save your pocket. Eggs from pure-bred utility strain, 12/6. Address: A. C. BULLER, Dwarsriviershoek, Stellenbosch.

THE

Agricultural Journal

OF THE CAPE OF GOOD HOPE.

No. 2. AUGUST, 1908. VOL. XXXIII.

Published Monthly in English and Dutch by the Department of Agriculture and distributed gratis to bona fide farmers in the Cape Colony on application through the Resident Magistrate of the District.

SUBSCRIPTION **5s.** PER ANNUM. Post Free in South Africa.

Remittances to be made Payable to the Publishers CAPE TIMES, LTD., Church St., Cape Town.

Postal Address:

The Editor "Agricultural Journal," Department of Agriculture, Cape Town.
Telegraphic Address: "Bulletin," Cape Town.

CONTENTS.

NOTES.

Correspondence with the Department of Agriculture.

With a view to obviating delay in dealing with official correspondence, letters and telegrams relating to matters falling under the administration of the Secretary for Agriculture should in future be addressed by the general public as under :—

I. To the Under Secretary for Agriculture, Cape Town.

Animal Diseases (other than Scab) : General administration of Acts and Regulations.
Cattle Dipping Tanks : Contributions towards construction.
Cattle Dips : Railage.
Bone-meal : do.
Scab Acts : General administration.
Insect Pest and Plant Diseases : General administration of Acts and Regulations.
Wine, Brandy, Whisky and Spirits Act and Regulations.
Fertilisers, Farm Foods, Seeds and Pest Remedies Act and Regulations.
Fisheries.
Agricultural Shows : Grants.
Brands Act.
Fencing Acts.
Destruction of Wild Carnivora.
Destruction of Locusts.
Guano and Sealing : General administration.
Game.
Parks and Gardens : Grants.
Noxious Weeds.
Appointments and changes of Staff.
Tende s.

II. To the respective Heads of Branches.

Subjects.	*Heads of Branches.*	*Telegraphic Addresses.*
1. Animal Diseases and detailed administration of Acts and Regulations relating thereto. Stock and Stock-farming.	Chief Veterinary Surgeon, Cape Town.	Veterinus, Cape Town.
2. Insect Pests and Plant Diseases, and detailed administration of Acts and Regulations relating thereto.	Government Entomologist, Cape Town.	Entomologist, Cape Town.
3. Administration of Agricultural College.	Principal, Elsenberg College, Mulder's Vlei.	Ager, Mulder's Vlei.
4. Cereals, Manures, Management of Experiment Stations, Applications for Seeds for trial, etc.	Government Agriculturist, Cape Town.	Agriculturist, Cape Town.
5. Orchards, Prun'ng and Fruit-growing in general.	Horticultural Assistant, Cape Town.	—
6. "Agricultural Journal" ...	Editor, "Agricultural Journal," Cape Town.	Bulletin, Cape Town.
7. Dairying	Dairy Expert, Queenstown.	Dairy Expert, Queenstown.
8. Wool-sorting, etc.	Govt. Wool Expert, Cape Town.	Govt. Wool Expert, Cape Town.

Subjects.	Heads of Branches.	Telegraphic Addresses.
9. Bacteriology	Director, Veterinary Laboratory, Grahamstown.	Institute, Grahamstown.
10. Agricultural Co-operation ...	Superintendent, Agricultural Co-operation, Cape Town.	Co-operation, Cape Town.
11. "Groot Constantia," Wine Farm...	Manager, Government Wine Farm, Groot Constantia.	Vitis, Wynberg.
12. Viticulture and Wine-making ...	Director of Agriculture, Cape Town.	Agriculture, Cape Town.

With the exception of the detailed administration of Acts and Regulations which are under the general control of the Under Secretary for Agriculture, the above subjects under this head are under the general control of the Director of Agriculture, to whom correspondence of a general nature bearing on these subjects should be addressed.

Subjects.	Heads of Branches.	Telegraphic Addresses.
13. Analyses of Soils, Minerals, etc. ...	Senior Analyst, Cape Town.	Neon, Cape Town.
14. Scab Acts: Detailed administration.	Chief Inspector of Sheep, Cape Town.	Acarus, Cape Town.
15. Guano and Sealing: Detailed administration.	Superintendent, Government Guano Islands, Cape Town.	—

These three subjects are also under the general control of the Under Secretary for Agriculture.

III. (*a*) To the Surveyor-General, Cape Town.

Land Acts and Land matters generally.
Mining Acts and Regulations.

(*b*) To the respective Heads of Branches.

Subjects.	Heads of Branches.	Telegraphic Addresses.
1. Mines, Kimberley, etc.	Inspector of Mines, Kimberley.	Mines, Kimberley.
2. Claims, Barkly West, etc.... ...	Inspector of Claims, Barkly West.	Claims, Barkly West.
3. Geology	Secretary to the Geological Commission, S.A. Museum, Cape Town.	—

These subjects are under the control of the Surveyor-General.

IV. (*a*) To the Chief Conservator of Forests, Cape Town.

General Forest Administration and School of Forestry.

(*b*) To the respective Heads of Branches.

Subjects.	Heads of Branches.	Telegraphic Addresses.
1. Forests, Western Conservancy ...	Assistant Conservator of Forests.	Forests, Cape Town.
2. Forests, Midland Conservancy ...	Conservator of Forests, Knysna.	Forests, Knysna.
3. Forests, Eastern Conservancy ...	Conservator of Forests, King William's Town.	Forests, King William's Town.
4. Forests, Transkeian Conservancy...	Assistant Conservator of Forests, Umtata.	Forests, Umtata.

These Conservancies are under the general control of the Chief Conservator of Forests.

Telegraphic Address.

It is notified for general information that the word "Agriculturist" has been registered as the Telegraphic Address of the Government Agriculturist of this Department.

Government Experimental Scheme for the Export of Fruit.

Notice is given that the assistance rendered by the Government to exporters of fruit during the past season under the Government Experimental Export of Fruit Scheme will be discontinued from the 1st October, 1908, and that accordingly after this date, shippers must arrange for the disposal of their consignments through their own agents oversea, and make such provision for the repayment of railway charges, shipping freights and other contingent expenses as may be necessary.

Agents for Export Fruit.

The Department of Agriculture is informed by the Trades Commissioner in London that he has received numerous applications from persons in England and the Continent desirous of acting as agents for the sale of Cape fruit. He thinks it necessary to warn all concerned that the greatest care should be exercised by shippers in forwarding fruit to agents unless quite satisfied of their business character and financial position. A special list of agents is being prepared by the Trades' Commissioner and will be available for the information of all intending shippers on applcation to the Agricultural Department.

Headquarters of Government Veterinary Surgeons.

The following is a list of the Government Veterinary Surgeons and their headquarters: —

Government Veterinary Surgeon.	Headquarters.
R. W. Dixon, M.R.C.V.S.	Cradock (absent on leave).
M. A. Hutchence, M.R.C.V.S.	Kokstad.
G. W. Freer, M.R.C.V.S.	Uitenhage.
J. Spreull, M.R.C.V.S.	Somerset East.
J. A. Robinson, M.R.C.V.S.	King William's Town.
A. Goodall, M.R.C.V.S.	Worcester.
C. Goundry, M.R.C.V.S.	Aliwal North.
J. H. L. Lyons, M.R.C.V.S.	Grahamstown.
W. G. Pakeman, M.R.C.V.S.	Queenstown.
S. Elley, M.R.C.V.S.	Oudtshoorn.
R. Paine, F.R.C.V.S....	Elsenburg Agricultural College, Mulder's Vlei.
P. X. Kearney, M.R.C.V.S.	Umtata (detained for special East Coast Fever duty at Bizana).
W. Simson, M.R.C.V.S....	Vryburg.
W. Jowett, F.R.C.V.S., D.V.H.	Cape Town.
C. S. Elphick, M.R.C.V.S.	Cape Town.

Fusicladium.

Reprints of the article on Fusicladium, which appeared in the last issue have been obtained, and copies sent to the Secretaries of Fruit-growers' Associations and Agricultural Societies, where the disease is most troublesome, for distribution to fruit-growers in their vicinity who may wish to have copies for reference. Secretaries who do not receive copies are invited to apply on behalf of parties to whom they would like the publication sent, giving names and addresses. Copies, both in Dutch and English, are available.

Cancellation of Free Railage on Dip.

It is notified that, from the 31st July, 1908, the Government will no longer bear the cost of railage or transport on the approved Cattle and Ostrich Dips enumerated in Government Notice No. 224, dated 24th February, 1908, which was cancelled and withdrawn from and after that date.

Tick Parasite.

Officials of the Bureau of Entomology of the United States Department of Agriculture have discovered that certain kinds of stock-infesting ticks in Texas are subject to the attack of an internal parasite, and have signified their willingness to assist in getting this beneficial creature established at the Cape. Steps to this end are now being taken. In its adult stage the parasite (*Ixodiphagus texanus*) is a tiny winged insect somewhat similar in appearance to the parasites which most commonly affect scale insects. It is not known yet whether or not it attacks the very common cattle tick of Texas, which is closely allied to the so-called Blue Tick of South Africa, but it has been bred from kinds in the same genera as the Dog Tick and the Brown Tick. No other true parasite of ticks has anywhere been discovered.

Farm Labour.

At the last meeting of the Paarl Farmers' Association, the following resolution was adopted:—"That kindred Associations be communicated with, asking them to consider and to discuss the advisability of introducing the testimonial system amongst farm labour, thereby arousing self-interest amongst that class of people and also interest in their work. That such organisations be invited to forward any suggestions in that direction to this Association so that points raised can be placed before those interested, in order that a practical scheme may be formulated."

The Export of Fruit.

The Hon. the Minister for Agriculture held a Conference with representatives of the Export Fruit Trade on July 14. The interests represented were as under:—Western Province Horticultural Board (Messrs. C. W. H. Kohler and A. A. Persse); Western Province Fruit Exporters' Association (Messrs. H. E. V. Pickstone and A. A. Persse); Shippers under Government Experimental Scheme (Dr. A. G. Viljoen, M.L.A., and A. J. Chiappini); Independent Shippers (Mr. A. Nicholson); Table Bay

Harbour Board (Messrs. Frank Robb, Nicholson and Mellish); Union-Castle S.S. Company (Messrs. McLean and Burman); Department of Agriculture (Messrs. J. Noble Jack, P. J. du Toit, and P. J. Hannon). Mr. C. E. Rennie, late Inspector of Fruit, was also in attendance. As a result of the Conference, the following is published for general information: —

I. *Culture and Varieties.*—It was decided that the Department of Agriculture should prepare a bulletin dealing with the various subjects affecting the export of fruit, and should more especially embody therein such information as is at present available on the varieties and classes of fruits which appear to be most suitable; the localities which experience has shown have secured the most profitable results; the apparent unsuitability of irrigated and vlei lands for the production of grapes for export; and the most approved methods of selection and packing.

II. *Fruit Packing.*—After discussion it was agreed that no further Itinerant Instructors in fruit packing be appointed by the Government, but that the experienced shippers should be invited to inform the Department of Agriculture whether they would allow those undertaking the work for the first time to visit their farms and packing-houses and study the methods employed. A Register to be kept at the Department of such shippers as are willing to afford these facilities, and applicants for advice on the selection and packing of fruit to be referred to one or more of them.

III. *Despatch of Fruit.*—It was unanimously agreed that the Government Scheme for the export of fruit in operation in the seasons 1907-8 should be discontinued, and that in future shippers should arrange for the disposal of their consignments through their own direct representatives in Europe, and should make such provision as may be necessary for the pre-payment of railway carriage and shipping freights. The Trades Commissioner will supply the Department of Agriculture with lists of British and other fruit factors and agents whose position in the trade and financial standing are regarded as satisfactory, and such lists will be available for the information of all shippers of fruit. The Government to continue the assistance heretofore rendered to shippers in facilitating the supply of boxes and wood wool through contractors. All such supplies to be sent out on the C.O.D. System, but no responsibility to be undertaken by the Government beyond the transmission of orders received from farmers or through Stationmasters to the Contractors. The Railway Department, through its Stationmasters to assist in the development of fruit export by helping in every way the distribution of fruit-packing requirements and the collection and forwarding of fruit for export.

IV. *Cold Storage at Cape Town Docks.*—The Conference resolved that the regulation hitherto in force with reference to the cooling of fruit for a minimum period of 48 hours in the Cold Storage of the Table Bay Harbour Board shall be strictly adhered to. After a discussion of the difficulties experienced during the past season in the efficient cold storage of fruit at the Docks, it was agreed unanimously that further cool room accommodation at the instance of the Harbour Board should be provided,

and the Minister directed that a letter with reference to this subject should be sent to the Secretary of the Harbour Board by the Director of Agriculture. The Department of Agriculture was requested to undertake in consultation with the Union-Castle Company an inquiry into certain new methods said to have been introduced for the cold storage of fruit.

V. Inspection of Fruit for Export.—After prolonged consideration of the various circumstances affecting the export of fruit during the past season, and in view of the continued reports of inferior and badly-selected fruit having been shipped, the Minister decided to take the sense of the meeting on the following questions:—(*a*) Whether there should be compulsory inspection of all fruit sent out of the Colony; (*b*) in the event of such inspection whether the Government should, or should not, brand such fruit according to grade; and (*c*) whether with such inspection and branding the Government should not have the power to prevent the export of all fruit failing to reach certain specified standard. Mr. Pickstone, representing the Fruit Exporters' Association, and Mr. Kohler the Western Province Horticultural Board, supported by the officers of the Department, strongly favoured compulsory inspection, the use of the Government brand and the rejection of inferior fruit; while Dr. Viljoen and Mr. Nicholson strongly opposed any interference with the liberty enjoyed by shippers.

VI. Shipment.—The Conference unanimously accepted the following suggestions of the Minister with reference to the conveyance of fruit by the Shipping Companies:—(*a*) That self-recording thermometers be provided in the ships' cool chambers to be kept under seal during homeward bound voyages and accessible for examination by officers of the Government at both ends; (*b*) that the temperatures at which fruit can most satisfactorily be carried should be carefully investigated by the Union-Castle Company so as to determine as far as possible the most favourable temperatures for each class of fruit; (*c*) that increased accommodation for the cold storage conveyance of fruit was necessary in the Union-Castle Company's steamers, and that the Company should consider whether it could not be provided; (*d*) that the preference which during the past season was given by the Union-Castle Company to the Fruit Exporters' Association should not be pressed too far.

VII. Freight.—It was the unanimous opinion of the Conference that in view of the fact that the cool chambers of the Union-Castle Company were during the past season wholly utilised for a period of nearly four months, the rate of 55s. per 40 cubic feet charged for the conveyance of Grapes is too high, and that the Company should consider whether a reduction is not possible. It was suggested that where fruit is shipped by intermediate steamers, the expenses incurred owing to the delivery at the East India Docks instead of Nine Elms Station should not exceed those of shipments by mail boats. The Minister directed that a letter be written by the Director of Agriculture to the Union-Castle Company, calling attention to the importance of this suggesion.

VIII. Treatment of Fruit on Arrival.—It was decided, in view of the negotiations at present in progress between the Trades Commissioner and the Southampton Docks Company, the London and South-Western Railway and the Union-Castle Company, that all matters affecting the reception and treatment of Cape fruit be left for the present in the hands of Mr. Chiappini.

IX. Distribution of Fruit in Europe.—The Conference unanimously resolved that the services of the Trades Commissioner in London be retained, and that he should act in the capacity of an agent for the shippers with reference to all disputes which might arise, and exercise such supervision over the distribution and sale of fruit as might be considered advisable, and should further continue the preparation of general and special reports for the information of exporters as at present. It was further urged that special study should be given to the possibility of larger development of Continental markets for Cape fruit.

Military Remounts.

Col. O'Brien, the officer in charge of the Army Remounts Department, at Pretoria, has been getting into close touch with our horse breeders during the past few months. And this should lead to more purchases in the future. During the last season he visited several of the more prominent agricultural shows, and as it seems likely that representatives of this branch will be doing the same next year, it would be as well if those agricultural societies in horse districts were to invite them to assist in the judging. A remount officer, as representing the only likely purchasers, should be of great assistance in judging purely remount classes. Of course this would not include the breeding classes for this type of horse, either sires or dams, but the remounts themselves. By doing this breeders would be more fully informed as to the type of animal desired.

Scientific Apparatus—Wine and Brandy Testing.

Messrs. Heynes, Mathew & Co., Cape Town, forward two catalogues of scientific appliances, the one showing a wide range of instruments and apparatus for microscopic and bacteriological work, the other giving an illustrated list of useful devices for testing wine and brandy. The uses of the latter and the methods to be employed are clearly and fully explained in simple terms in both English and Dutch, so that any farmer of ordinary intelligence can make tests for himself by carefully following the instructions. The tests include those for sugar in the must, acidity of the must; total acidity of wines; volatile acidity of wines; and total alcohol in wines and brandies.

FARM AND VELD.

Distribution of Agricultural Seeds to Farmers.

The distribution of agricultural seeds by the Department of Agriculture, free of charge, to farmers in Cape Colony, for experimental purposes will in future be subjected to the following conditions: —

1. Only such seeds as are still in the experimental stage, in any given locality, will be issued.
2. Not more than five varieties will be supplied to any one applicant.
3. The quantities distributed will be such as to admit of the yield being accurately estimated.
4. No seeds will be given unless the Department is satisfied that the applicant will furnish an accurate report, the most important item in which is the actual yield per acre as ascertained by weighing.
5. Applications for seed for the ensuing sowing season must come to hand not later than the 30th October next. After this date no applications will be considered until the autumn sowing season starts, when seed will again be distributed for a period of about two months. All applications, whether from individuals or from Secretaries of Associations or Societies should be addressed to the Government Agriculturist, Department of Agriculture, Cape Town.

LISTS OF SEEDS FOR DISTRIBUTION.

Leguminosæ. Beans: Tick or horse, Soja, Locust Bean. Vetches: Spring, Winter, Kidney. Clover: Dwarf White, Hop, Red, Alsike, Crimson, Egyptian, White. Lucerne: Provence and Turkestan. Tagasaste: (Tree Lucerne). Sainfoin: Common Milled and Giant Milled. Serradella. Cow Peas: Zwartbekje, Clay, New Era, Coffee, Calico and Blue Hull. Lupins: White, Yellow and Blue. Teosinte. Melilot: Yellow (*Melilotus officinalis*). Sulla: African.

Root Crops, etc.—Mangold: Long Red, Yellow Globe, Golden Tankard and Half sugar white. Turnips: Purple Top Mammoth, Green globe and Fosterton Hybrid. Swede: Webb's Imperial Purple Top. Rape: Essex and Summer. Kale: Thousand-headed and Hardy branching. Pea Nuts.

Grasses.—Rye Grass: Italian, Perennial and Devon Evergreen. Cocksfoot Grass. Paspalum Dilatatum. Festuca: Pratensis L. (Meadow Fescue), elatior L. (Tall fescue), duriuscula L. (Hard fescue), rubra L. (Red fescue) and ovina L. (Sheep's fescue). Rescue or Brome Grass. Short Bushmans Grass. Tall Buchmans Grass. Tall Oat Grass.

Sorghums, Millets, Maize, etc.—Sorghum: Planter's friend, Minnesota Amber cane, Brown seeded and Kafir corn, White. Millet: Japanese, White Italian, Boer Manna, N'Youti, Rapoko, Pearl and Hungarian. **Maize:** Cinquantina, Sweet fodder, Pride of the North, Pedrick perfected

Golden Beauty, Snow White Dent, Wisconsin White Dent, Early Yellow Canada, White Cap Yellow Dent, Long White Flint or Sanford, Hickory King, Champion White Pearl, King of the Earlies, Leaming Early, Rural Thorough-bred Flint and Brazilian Flour corn. Broom Corn. Pop Corn: Rice and White Pearl.

Miscellaneous.—Chicory: Madgeburg, Witloef and Short Brunswick. Cotton: American Rattler, Colonial Seed and Egyptian. Blaauwzaad Grass. Sunflower. Flax: Riga.

How to get rid of Spring Hares.

A correspondent writing from Phillipstown, asks for some sound method for eradicating spring hares which are a great plague with him. Many plans have been recommended from time to time, which include trapping, snaring, poisoning, and even drowning. Each of these have their advocates, but we are assured by one who has successfully applied it that the following plan always works most effectively. Purchase an ordinary fumigating sulphur candle from the local chemist. Light the candle, place it in the burrow and close up all outlets. The fumes will then rapidly pass through every passage destroying all animal life. These candles, our informant adds, burn practically without air, so there is no need to fear non-success through covering up the burrow. This method is much easier, surer and quicker than trapping.

Arsenate of Lead.

The lasting properties of arsenate of lead when applied to foliage are well illustrated by the following occurrence. At Simondium, on July 11th, the Government Entomologist noticed that spray stains were still in evidence on the few remaining leaves in an apple orchard through which he chanced to pass, and gathering a few leaves he crushed them into his pocket. Four days later he found them again and saw that, despite their dried and rubbed condition, they still showed stains. He took them to Analyst Lewis, of the Chemical Department, who took two at random and tested them for arsenic, and thus showed that the poison was present in abundance. The tree from which the leaves came was merely sprayed in the ordinary course for codling moth during the past summer. The manager of the orchard did not recall the time of the last application and thought it might have been as late as March; but it is quite certain that no spray had been applied within three months and probably none for over four months. Meanwhile there has been much rain and heavy wind.

Penicillium digitatum.

The Department of Agriculture is officially informed that the Transvaal authorities are issuing a Government Notice to the effect that any consignments of oranges, lemons or other citrous fruits introduced into the Transvaal will be confiscated and destroyed or returned to the consignors if one per centum of the fruits is found infected with *Penicillium digitatum*. The fungus named is the cause of the very common whitish and greenish mould of the fruits in question. It is very apt to develop on fruits that have been bruised or injured in any way, even by the finger-nails in picking, and shippers are therefore advised to forward only perfectly sound fruit, well wrapped and packed.

Desert Melons as Feed.

Mr. P. W. Rubidge, of Corndale, District Aberdeen, writes, forwarding snapshots (reproduced herewith) of a crop of "Mankatana" (a melon grown in the desert by natives). I consider it, he says, a wonderful cropper, and I should say far surpasses mangel wurzel, as it can be grown with much less water and matures sooner. It is a splendid stand-by in case of drought, and in any case to be fed in the scarce months of July, August, and September, when green food is generally off. I planted about 1¼ lbs. of seed in 2 morgen of ground, in rows 4 yards apart, besides rows of mealies every 4 feet. I calculate the yield to be about 12,000, besides 12 muids of mealies. Considering the dry season, this I think a good crop, only being irrigated twice, and only a very light rainfall. I think if these melons are put in in November or the end of October a much heavier crop would be ensured. Mine were put in about the 10th of December, 1907. Most farms have a little good soil along a spruit or laagte, and a couple of morgen closed off for the purpose of growing this melon would be money will spent. Some of these melons weigh 50 lbs.

In a later communication Mr. Rubidge says he believes these melons to be a good feed. He kept one cow for more than a month on them and a little lucerne hay. She is keeping her condition well, and gives a very good yield of milk. The melon is very fleshy. He also encloses a letter received from Mr. Harold C. Glennie, of Putfontein, Aberdeen, from whom

he obtained the seed. Mr. Glennie says: "We obtained the seed originally from the Vryburg district, Bechuanaland, some eight years ago. I can give no scientific details of their feeding value, but it must be high, the seeds especially being full of carbohydrates. But I know in practice that they are simply invaluable as a winter and spring feed, especially in a drought, and for every class of farm stock, from poultry to horses. I know that, as an Angora farmer, I could not be without them for anything, as they come on in the kidding season, when there is so seldom any succulent food to be got by either ewes or kids, and the effect they have in increasing the milk supply is nothing short of marvellous. Dry as it has been this season—5 inches of rain in fourteen months—I got a fairly good crop of them, and hope to get through the winter without serious loss by their help."

Insect in Beehives.

Mr. B. Bowker, of Signal Hill, Carlisle Bridge, writes:—Can you or any of the readers of your *Journal*, inform me how to rid my beehives of a small insect about the size of a bug, which has nippers like a scorpion? I think this insect lives on honey, as the bees seem very discontented.

The creature in question is undoubtedly a pseudo-scorpion that is not uncommonly found in hives, but on no previous occasion have I heard it suggested that it eats honey or in any serious way annoys the bees. Generally only a few are found in a hive, and these are usually resting on the woodwork. Specimens are now and then found on fences, under stones, in decaying wood, and beneath the bark of trees, and it has been thought that the presence of the creature in hives was quite accidental. Pseudoscorpions in general are believed to prey on mites and very small insects, and it has been suggested that they attach themselves to relatively large insects such as flies and bees merely to get carried to new surroundings. If this is true it would not be strange for odd specimens to get stranded in hives. I think hand collection will be found the easiest way to deal with them.—C.P.L.

Peach Tree Aphis Pest.

Nearly every year peach trees in many sections of the east of the Colony suffer severely, early in the spring, from the attack of aphides or plant lice. Two kinds of these insects occur, one greenish and the other blackish. The latter is much the more widespread, but the former seems quite common in districts along the Orange River. In some seasons the lice appear in such abundance that the trees are practically smothered with them, and the sticky "honey-dew" which they give off attracts innumerable flies, ants, and other sweet-loving insects. The leaves become distorted and crinkled and the twig growth stunted, and often trees lose most of their foliage owing to the attack. The aphides breed with wonderful rapidity and, as a general rule, by the time a farmer has recognised the need for action the damage has mostly been done and the aphides are at a standstill or decreasing in numbers because of the work of insects which feed on them, like ladybirds and their grubs, aphis lions, syrphus

maggots, and internal parasites. Often the farmer mistakes those beneficial insects as concerned in injuring the trees. The use of sprays at this stage does some good, but is usually disappointing, because such great numbers of the aphides are hidden in curled-up leaves, and thus escape. The proper time to take action is shortly before the buds open. The farmer should be on the look-out in the late winter and early spring, and if any of the aphides are present he should spray the trees very thoroughly, taking care to get every part of the surface well wetted. After four or five days the trees should be carefully examined, and if any live aphides are found, a second thorough application should be made. It is advisable to spray at least twice if many aphides are on the trees in the first case, and sometimes a third spraying is necessary; but whether one or more are applied, the dependence of satisfactory results on thoroughness of treatment should be kept in mind.

The spraying mixture may be paraffin emulsion, made by adding a gallon of paraffin to half a gallon of boiling water, in which a pound of soap has been dissolved, and then beating or churning the mixture five to ten minutes or until a uniform emulsion without free oil results, after which the whole is diluted with fifteen gallons of water; or with soap suds containing a pound of good soap to four gallons of water; or with "resin wash"; or with a strong infusion of tobacco. Excellent results are reported for tobacco sheep dips. Brands which have the reputation of being uniform should be preferred, and the best may stand dilution with 150 parts of water. Some farmers believe in using them as strong as 1 in 70, and unless a weaker strength of a chosen brand has been tested and found satisfactory it is advisable to have at least 1 part in 100 parts of water. Small pumps, similar to those used for spraying locusts answer very well for treating small numbers of trees, and they may be bought for about a guinea each in the larger towns.

Woolled Persian-Merino Cross.

The woolled Persian sheep, which is being introduced to the Eastern Province, seems to have thrived well in America. A correspondent, writing to the "American Sheep Breeder," gives the following particulars of a lot of 126 raised on his ranch near Los Angeles:—"The Persian ram weighs 240 lbs.; wool light and long; a slightly reddish colour at the base, shading to white. Sheared 13 lbs. for eight months' growth. Ears long and drooping; Roman nose. The ewes bred to him were inbred Merinos, heavy woolled, and good size; sheared 14 lbs. for twelve months' clip. The ewes are not noted for prolificacy, usually having one lamb, nor are they specially good mothers; still, out of 80 ewes, 126 lambs were dropped; one morning five pairs of twins out of six ewes. The lambs are all red-bodied, with white face and tails, unusually large and strong at birth, and need no assistance. One ram lamb weighed 103 lbs. at four months, the other two, ewes, 96 and 91 lbs. respectively; not so bad for lambs that have not had any grain or special care at all. In the test made at the ranch the result was as follows:—Lamb weighed alive 69½ lbs.; market dressed it weighed 37½ lbs., hind leg 5¾ lbs. The meat is whiter than that of any other mutton, the flavour more delicate, and the shrinkage less than any other breed of sheep we have killed. For early, hardy, strong growing, hungry lambs which will weigh 70 lbs. at 90 days old, these are hard to beat."

Windmill Pumps on Boreholes.

Mr. H. Francis writes:—"Judging from newspaper paragraphs and hearsay, there must be many boreholes in the country yielding from 2,000 gallons to 5,000 gallons per hour. These holes are presumably tested by long-stroke pumps carried by the boring plants; and doubtless the owner of such a fine water, having verified the test, drawn his cheque, and seen the unwieldly machine fade into the distance, feels in a very complacent frame of mind. Disillusionment comes with the windmill agent. If the water is too deep to be reached by a pump placed at ground level, the once proud and happy man is dismayed to find that no mill on the market will pump more than a fraction of his water. The standard borehole may be taken as six inch, which admits of the lowering of a 5½-inch cylinder.

"Wind-motors, like internal combustion engines, have no great flexibility of speed. They are designed for a certain number of revolutions per minute, and, to secure due efficiency, must be run at that speed I believe the wind-wheel revolutions are usually from 50 to 80 per minute, which, with the usual gearing back, gives about 25 strokes per minute to the pump. With this stroking a 5½-inch cylinder should deliver about 130 gallons per hour per inch of stroke. Thus to deliver 2,000 gallons, 3,000 gallons, 4,000 gallons, 5,000 gallons per hour necessitates a stroke of 15 inches, 23 inches, 30 inches, 38 inches respectively. But what do we find on examining the windmills? We discover that they are designed to give about an inch of stroke per foot of wind-wheel diameter, *i.e.*, a 10-foot mill has a 10-inch stroke, a 16-foot mill a 16-inch stroke. Therefore with a fixed diameter of cylinder they deliver water in a ratio directly as their wind-wheel diameters. Their actual power, however, is in a ratio even greater than the *squares* of their diameters.

"To take the figures published in a brochure issued by the S———r Company, whose mills have a large sale, and are not radically different in design to other crank-shaft mills, it appears that the 10 ft., 12 ft., 14 ft., and 16 ft. sizes have strokes of 10 in., 12 in., 14 in., and 16 in. respectively, but their horse-power is given *proportionately* as 10, 17, 27, and 48.

"To put it in another way. X.Y.Z. has a 10-foot mill which cannot cope with his water. He instals a 16-foot, which gives him 60 per cent. increase, but he is paying for a plant capable of giving 380 per cent. more power. This is very ridiculous. It points to the fact, however, that, supposing that makers do not care to alter their patterns to suit a possibly restricted market, there should be a good opening for some stroke-lengthening device which could be purchased independently of the tower and head. It should be fixed at the well-head and be intermediate to the pump and well-rods. Some system of levers on the principle of the "lazy-tongs" might do. Until some such arrangement is procurable anyone striking a good water should have the hole reamed before the machine is shifted. He can then remedy the short-stroke defect by putting down a larger cylinder. Many have realised this too late."

Deterioration in Farm Fowls.

"Colonist" writes:—"The usual fowls seen on many of the markets throughout the country are generally very small, the weight averaging from 2 to 4 lbs. This means that when they are killed for table there is really very little bulk of meat, for the loss in offal would vary from about 1¼ to 2 lbs. This smallness in size accounts largely for the small price frequently obtainable, though not always, for the supply and demand at certain seasons also causes a rise or fall in prices, but if the birds were placed on the market larger in size and better in condition, then the price would be increased in like measure. Farmers when spoken to on the subject often tell you that they have bought various thoroughbreds and turned them in the yard, and the size ought to be better. But if a visit is paid to the farmer's yard, what do we see? There are a few fine cocks, and some of the hens are first class, but there are any amount of young undeveloped cockerels running loose among the hens, and we realise at once what is the matter.

"Why are the farmers so foolish in allowing one of the most remunerative adjuncts to the farm to go to ruin? They surely must know better. Would they, for instance, go to the expense of buying a first-class stallion, bull, or ram, and allow a lot of undeveloped cross-bred wastrel males to remain with their mares, cows, or sheep, and hope to improve their stock? They would laugh at the idea, yet that is actually what many are doing with their poultry, and there is little wonder that no great improvement is obtained. There are many reasons why the sexes of young undeveloped birds and animals should be kept apart, especially when they are kept under partially artificial conditions. We must not lose sight of the fact that when we start to improve the productive powers of anything we immediately commence to work against Nature in some way or other, and hence we must make allowances for some. If we do not, then the improvement gained will soon be lost.

Caponising the Remedy.

"In obtaining early maturity we naturally force on all the organs, and especially those of the male. And the reproductive organs frequently advance much too rapidly, especially in some varieties of poultry, and hence it is absolutely necessary that we either entirely separate the young cockerels from the flock or else caponise them. There is no doubt that caponising all, except those intended for stock purposes, is a good plan.

The value of caponising is seen in several ways.

1st. The birds can, after being operated on, run with the flock.

2nd. They never worry in the slightest, but simply go on growing and developing flesh.

3rd. The flesh is greatly improved, and is more delicate in flavour.

4th. They can be disposed of at larger prices and whenever the market is suitable to the seller. In fact, the value is in the same proportion as that of a ram and wether, bull and ox. The operation is not difficult, and if cleanliness is observed there is little danger of any loss The instruments are obtainable at many of the various firms of instrument makers and such other firms as supply poultry food or appliances, and full directions are given as to the method of operating. Our Colony is going through a rough time, but don't let anyone despair. Let us all in our various paths of life do our utmost to improve whatever we have in the way of live-stock, etc., and thus when markets improve and opportunities

occur in the future, we shall be prepared to face the keenest competition. Don't despise the small adjuncts to the farm, as the small side-lines are often of greater value than many realise."

Pineapple Juice.

One of the novelties which is, we understand (says "The Fruit-grower" of June 11), to be seen at the Franco-British Exhibition is a gross of pint bottles of pure pineapple juice from the colony of Queensland. The Agricultural Department of that Colony have been experimenting for some time making pineapple juice from waste peelings of pineapples. If the peelings are worked up at once, before fermentation takes place, a pure pineapple liquor, free from alcohol, is the result, which can be bottled off and kept without any preservatives. This juice can be used in its pure state, or diluted with water, and if aerated makes a sparkling and palatable drink. The peelings are passed through a pug mill, and then pressed in a strong press. The juice is run through a sieve or cloth to remove any floating substance, and is then heated to about 170 degrees for about half an hour. The clear juice is syphoned off and again heated to 170 degrees, and bottled whilst hot and corked at once. The filled bottles have again to be heated after twenty-four hours by placing them into a wooden steam chest, where they can be gradually heated to 165 degrees, and kept at that temperature for about half an hour. This heating is repeated after another twenty-four hours' standing, and this completes the treatment, and absolutely sterilises the juice, so that it will keep indefinitely.

Smyrna Figs for Drying.

The Agricultural Department intimates for general information that the distribution of fig cuttings, announced last month, has now been suspended, as all the stocks available have been exhausted. It is much regretted that inconvenience will be caused to those numerous applicants whose requirements cannot be met.

MILK RECORD.

ELSENBURG COLLEGE HERD.

Subjoined is the Milk Record to the 31st July, 1908 :—

Breed and Cows.	Days in Milk.	Yield in Lbs.		
		During July.	Total to date.	Daily Average.
FRIESLANDS.				
Rose	332	184	8,502	25·6
Cleopatra	162	1,031	7,124	43·9
Daisy	140	322	1,927	13·7
Romula	137	833	4,565	33·3
Victoria	127	987	4,103	32·3
Bell	21	778	778	37·0
Violet	1	16	16	16·0
JERSEYS.				
*Grace	347	39	4,660	13·4
	15	307	307	20·5
Gilliflower	335	175	6,870	20·5
Nora	182	363	3,207	17·6
Gladys	81	691	1,833	22·6
Gertie	43	841	1,132	26·3
Rosa	21	400	400	19·0
AYRSHIRES.				
Cherry	64	787	2,036	31·8
Lobelia	39	1,020	1,268	32·5
Queen Dot	31	1,027	1,027	33·1
SHORTHORNS.				
Maggie	21	721	721	34·3
CROSSES.				
Bessie	262	818	9,018	34·4
Disa	137	629	3,220	24·9

* Grace calved during July.

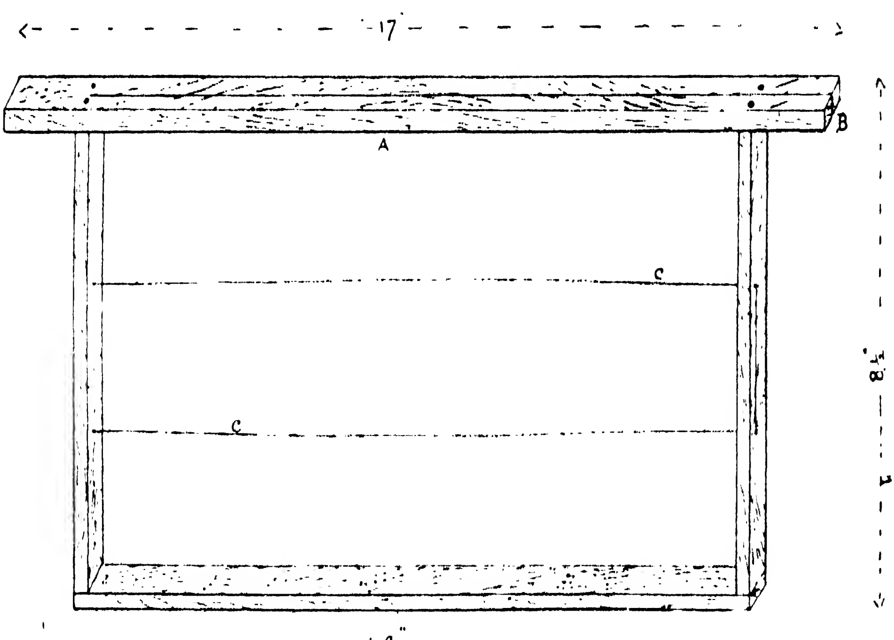
SOUTH AFRICAN BEE-KEEPING.

By H. L. Attridge, F.R.Met.Soc.

(Lecturer at the late Agricultural Schools at Stellenbosch and Somerset East and Apicultural Adviser to the Department of Agriculture.)

(Continued from page 56.)

Frames.—The dimensions of the frame recommended are as follows:—Length of top bar, 17 in.: outside measurements, 14 in. x 8½ in. Top bar, ⅞ in. wide and ⅜ in. thick. Ends and bottom bar same width, ¼ in. thick. There is no objection to the use of stouter material, but it is unnecessary. The outside dimensions of all frames must be exact.

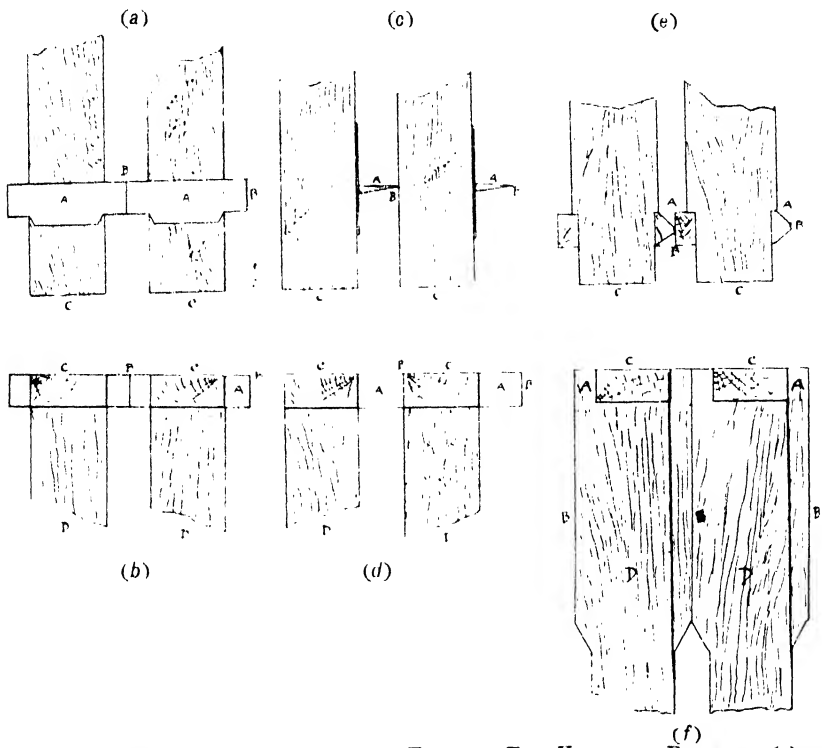


Standard Bar Frame.—A Top Bar. B Saw Cut. C wire to secure foundation.

Spacing Ends.—Various methods of spacing frames are in vogue, the principal ones being metal ends, wire staples, and wood ends; the top bar being left wider towards one end on alternate sides; these are known as "broad shoulder" frames. The American frames have the upper part

of the end bars widened, which answers the same purpose. The objection to this form of frame is that too much of the edges are in contact, which is very undesirable, owing to the quantity of propolis used by the native bees. I introduced a metal end some time since, which I have found better than any other tried, and it reduces the chance of propolisation to a minimum. It has but a $\frac{3}{8}$ in. knife edge in contact with adjoining frame, against the 3 inches of the Hoffman frame, and the lower edge is so cut that the frame is kept at the correct distance from the sides of hive. Frames are usually spaced $1\frac{9}{20}$ to $1\frac{1}{2}$ in. from centre to centre, but if it is desired to prevent the raising of drone brood—supposing worker foundation is not used—the distance must be reduced to $1\frac{1}{4}$ in.

Body of Hive.—A hive carrying 10 to 12 of the above frames will be large enough for general purposes. If the frames are placed running at right angles to the entrance, two division boards or "dummies," as they



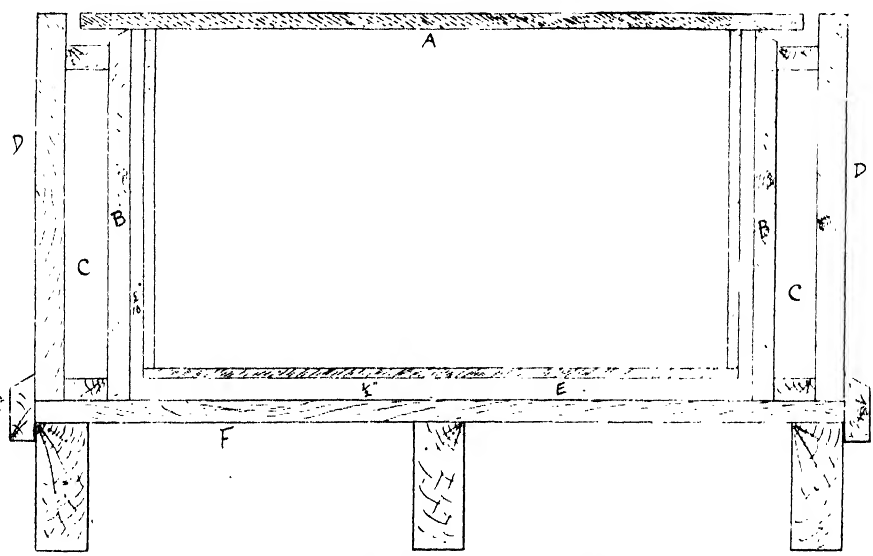
SPACING ENDS FOR BAR FRAMES. TOP AND END VIEWS OF FRAMES. (*a*) and (*b*) English method, W.B.C. pattern; (*c*) and (*d*) Author's method for South African conditions; (*e*) and (*f*) American method, Hoffman Frames.

are called, will be required; the purpose of these boards is to allow for reduction or enlargement of brood nest, according to the size of the colony. If the frames are hung parallel to the entrance, one "dummy" will suffice; by placing the frames in this direction the apiarist can stand in the rear of hive during manipulations, with less inconvenience to the bees going out and returning to the entrance. We have practised both methods, and have found the latter the most convenient of the two.

Floor Board.—The floor board should be detachable from body box and for preference supported on legs, which means less chance of accommodating lizards, snails, frogs, ants, and other unpleasant intruders, which frequent hives, resting direct on the ground.

Entrance Slides.—The entrance to a hive should be sufficiently large for summer use, with means of contracting the opening in winter. We find that many of the hives we examine do not admit of this. Entrance slides as generally supplied to imported hives are practically useless, the bees thoroughly fixing them with propolis during the first season; the simpler the means adopted for this purpose the better.

Quilts.—Quilts are used for the double purpose of confining the bees to the frames, and preventing the escape of heat. Any warm material can be used for this purpose, three or four thicknesses of old carpet or wool bag will answer very well. It will be well to have a single thickness of calico next to the frames, which can be renewed occasionally. For a snug winter covering a shallow tray about 3 inches deep, with canvas bottom and filled with sawdust, will answer admirably.



SECTION OF BAR FRAME HIVE.—A top bar of frame. B inside wall. C dead air space. D outer wall. E bee space. F floor board. G fillets.

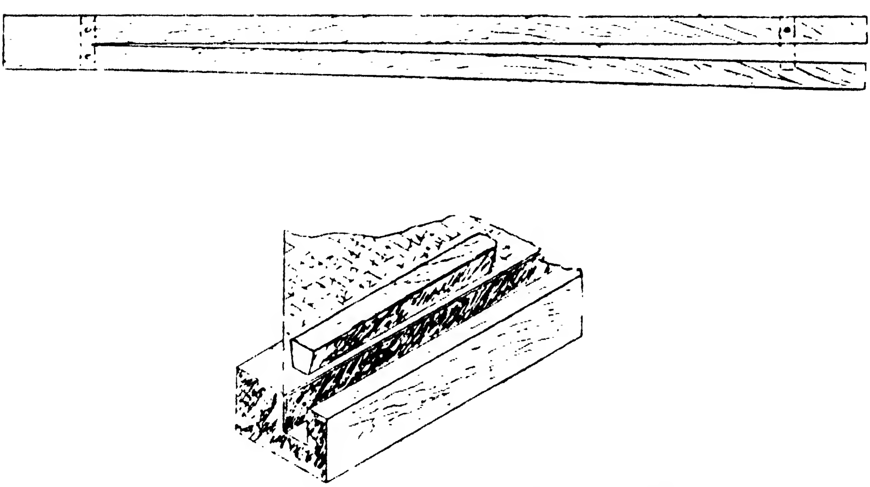
Crown Board.—Some bee-keepers prefer what is known as a "crown board" for covering frames, instead of quilts. This is a flat board about ¾ inch thick, having a raised border on the underside, about 1 inch wide and ¼ inch thick, to allow bee-passage over tops of frames. Glass has also been used for this purpose. For ease in manipulating we prefer the quilts, and there is less disturbance to the bees.

Roof.—Leaving out the surplus honey chamber and outer casing to same for the time being, we come to the roof. Providing this is made water-tight and allows of plenty of ventilation, the design and finish can be a matter of taste. The illustration of author's hive showing a gable roof will be found a very serviceable type. It is essential that the roof be provided with ventilating openings, to allow a current of air to pass right across the interior of hive; this will remove all dampness and prevent condensation.

Paint.—Roofs should receive a frequent coat of white paint. The other portions of hive should be painted a coat of some light colour before each winter. We did not allude to non-porous quilts of enamel cloth; these answer very well over strong colonies, but plenty of warm wraps must be put on top to prevent condensation on the under side. The hive

as illustrated for summer use provides space for three boxes of shallow frames or sections above brood nest. *Hive Making.*—We have now enumerated certain principles relative to hive construction, and sufficient information has been given which, with the help of the foregoing illustrations, will enable the beginner to make a fairly satisfactory hive, but in most cases, unless possessed of a good knowledge of woodwork and done some practical work with bees, it will be found more advantageous for the beginner to purchase hives ready-made, selecting a pattern embodying the above principles as near as possible. If a number of hives are required, one or two can be ordered made up and the remainder in the flat, that is, in pieces cut to right measurements, to be put together on arrival.

Comb Foundation.—To the modern bee-keeper foundation is a most important and necessary article. We have already referred to the expenditure of honey in the production of wax when supplied entirely by the bees. To reduce this cost and to save valuable time foundation has been brought into general use. Foundation is now made by passing sheets of prepared wax through a machine having engraved rollers; the preparation of the wax is rather an intricate and delicate process, and requires an amount of skill and practice. While running through the machine the



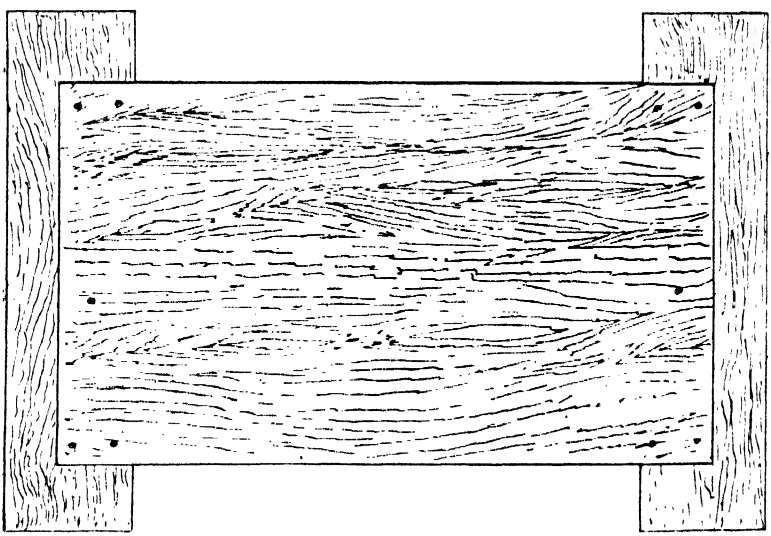
METHODS OF FIXING FOUNDATIONS.—Split top bar and wedge.

sheets of wax receive impressions the fac-simile of the base of natural comb, with the side walls slightly raised above the septum. This is known as "natural base" foundations. Another kind, having the side walls raised, but the septum left flat, is known as "flat bottom" foundation; this at one time was largely used for supers. Another make, having a corrugated base, has been found very suitable for South African work. It has sufficient material in side walls for the bees to lengthen out to natural depth of cells, and not being subject to the great pressure applied by some machines, the wax in the side walls is left soft, and easily moulded by the bees. Foundation made by what is known as the "Weed process" is now being pushed by some American houses, but beyond the rapidity of manufacture, which is advantageous to the makers only, it offers no particular superiority to other makes, that is, as far as its acceptance by the bees is concerned, which is the first consideration, and its cost is no lower. Foundation for use in the brood frames and for extracting purposes should weigh about 6 sheets to the pound. That used for super work can be

thinner, say, 12 sheets and upwards. It is of paramount importance that only foundation made of *pure* bees-wax be used. Paraffine wax is frequently employed to adulterate, and although this composition will be worked out by the bees; owing to its low melting point, it breaks down on the advent of hot weather. By the use of foundation all worker comb can be secured of even surface if wanted, and built out much quicker than natural comb when the bees have to supply their own material.

Fixing Foundation.—Various methods are in vogue for fixing foundation to frames, perhaps the simplest is by using a sawn top bar. As will be seen, the saw cut is run nearly the whole length of top bar; in making up the frame one side is left free; this can be opened out and the foundation inserted very quickly, the fourth nail making all secure. The feather edge and wedge method is very good, only this requires a stouter top bar, and is more trouble to make. Foundation can also be run in with a little wax by using a board made as follows, which will also be useful for wiring foundation:—

Gauge Board.—Take a piece of board slightly under ⅜ inch thick cut to fit the inside of frame. to this screw two battens about 3 inches wide and ¾ inch thick, projecting about 1 inch beyond the ends of first piece,



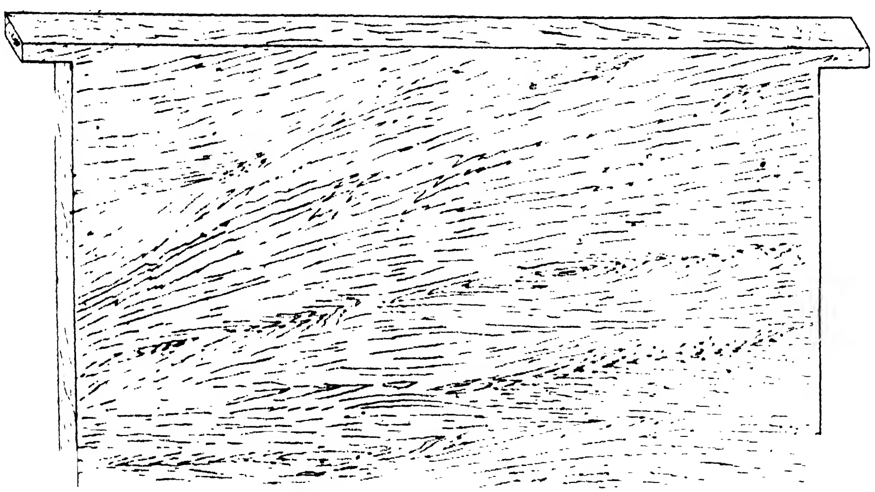
GAUGE BOARD.

as shown. Lay the frame on this board, the side bars resting on the projecting ends. A sheet of foundation is now laid on the board and adjusted to meet the under side of top bar. About ½ inch should be left clear of bottom bar, to allow for stretching of foundation when placed in hive. Now prepare a little hot wax and provide an old spoon. Having tilted the board carrying frame, run a little of the heated wax along the angle between top bar and foundation.

A wax smelter with spout and outer water jacket will be found useful for this work, if there is much to be done. It is economy to use whole sheets of foundation, but in any case starters of 1 or 2 inches in depth must be used.

Wiring Foundation.—To strehgthen foundation and make the comb when completed easier to handle full sheets are usually wired in. Sometimes four or five vertical wires are used, but we prefer two horizontal

wires, which will be sufficient if foundation of proper thickness is used. For fixing foundation in addition to the gauge board have ready a bradawl, some fine wire (tinned), thinner than bottling wire (No. 30 gauge is that generally employed). A small instrument for embedding the wire can be made by filing a small V-shaped notch in the end of a four-inch nail, or an old bradawl. The side bars should next be pierced with two holes some few inches apart, then the two horizontal wires laced across the frame above foundation, fixing the ends in the most convenient manner. The whole now lying on the gauge board, take the imbedder, and after heating in hot water or over a lamp, apply the V notch to the wire, gently pressing it into the foundation. The board should be previously moistened on the surface to prevent foundation sticking during this operation. There are other and more elaborate tools for wiring purposes, which we need not dwell upon here, our aim being to simplify things as much as possible for the beginner. It is important that all work with foundation



"Dummy" or Division Board.

should be done in a warm room, or the foundation should be placed in warm water before using. This will keep it soft and pliable. At a low temperature foundation of pure bees-wax becomes very brittle.

CHAPTER XII.

Location of Apiary.

We shall presume that our reader has now put his hive together, wired the foundation into brood frames, and hung them in the body of the hive, that he has placed the division board and quilts into position, and generally mastered the details ready to receive the bees.

As bees are not easily moved short distances after once used to their surroundings, it will be well to fix upon a suitable position for permanent stand.

If it is proposed to keep a number of hives, this matter will require careful consideration. Select a stand protected as much as possible from the prevailing winds of the district, having a north-east aspect if obtainable, for it will be found that the bees of those hives which first feel the effect of the morning sun will be the first on the wing, other things being equal. If shade can be obtained during the hottest part of the day so much the better, although this is not of such material importance where properly designed hives are in use. Wherever the hives are placed, let them be well within reach of daily observation, remembering that the appearance and movements of the bees at the entrance is usually a good criterion of what is going on inside. Have a path at back of hives and keep spaces around hives clear of all vegetation. The ground where they stand must be firm, and made perfectly level. Hives should be placed 6 feet or more apart, and should never be put nearer than 3 feet to each other. A few trees dotted about the apiary will afford shade for the apiarist and will be appreciated while pausing between manipulations or taking notes.

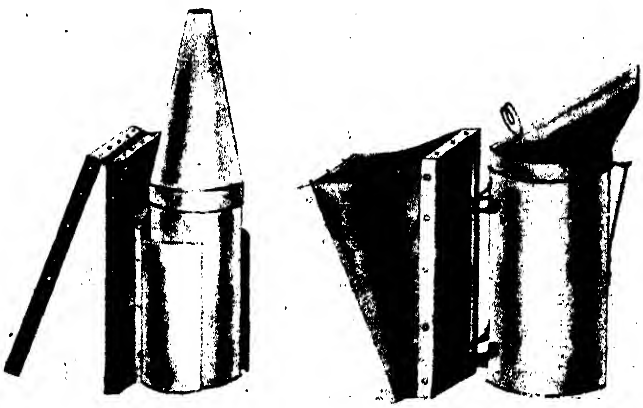
Examining a Bar Frame Hive.

CHAPTER XIII.

Subduing and handling Bees in Frame Hives.

Some stocks are naturally good-tempered and others show marked characteristics in the opposite direction, while all at certain times may exhibit a little irritability. There are many extraordinary and greatly exaggerated tales told about the ferocity of the Cape bees, but this need not discourage the beginner, who will soon get accustomed to their ways. The writer well remembers the warning he received when on his arrival at the Cape he made inquiries about the position of the bee industry here. He was told that to attempt to manipulate native bees in frame hives would be attended with very serious consequences to himself, would set the whole neighbourhood in an uproar, and place the lives of man and beast in jeopardy. It is needless to say that this not very mild caution made the writer a little diffident in approaching the first lot of such dreadful creatures (although well acquainted with several other races). At the

close of the operation, however, conducted with bare hands without receiving a single sting, he expressed to his advisers an opinion to which he still adheres, after continued practice at all seasons during a period of some eighteen years: That the Cape bees are as tractable as most varieties, and very much more docile than many of our European hybrids. But proper handling is required. It is not the man that goes to a beehive in the hurried way he would enter a burning house to rescue the inmates that



Smoker and Bee Veil.

makes the successful beemaster, although he may make a boast of being able to subjugate bees and disregard the effect of their stings. He may not be wanting in confidence, but is certainly lacking in other qualities quite as desirable and necessary to proper management, and he has yet to learn that bees are generally amenable to tender treatment. The worst aspect of the case is that continual rough usage and injudicious surprises leave a bad impression with the bees, and it is the colonies subject to this kind of treatment that frequently develop into the ferocious ones we sometimes hear of and occasionally have to deal with. If with the application of reasonable means, a colony refuses to become docile, the owner should try re-queening it with fresh blood; failing any good result, and he feels persuaded that the fault is not on his side, he should then seriously consider its extermination, or its bad qualities may disseminate among other colonies. Bees are readily alarmed with smoke,

when they usually begin to fill themselves with honey, and in this condition are not disposed to sting. If it is desired to inspect a hive, charge the smoker with some suitable fuel and light it—brown paper, rag, or touchwood will answer well. It will be advisable to wear a veil, which will give protection to the face, and help to give confidence. Approach the hive from behind, take the cover off quietly, slightly raise the quilts, and give a few puffs of smoke amongst the frames. Having given the bees time to "gorge," proceed with expedition, draw back the dummy sufficiently to give plenty of room for lateral movement of frames, manipulate with gentleness, and you will save the bees' temper and your own hands. Separate carefully each frame from its neighbour, be deliberate in every movement, but avoid passing the hands rapidly above the frames; in re-adjusting, bring the ends close to each other without crushing a single bee; give a little smoke over the tops of the frames, and in replacing the quilts observe that no openings are left by which the bees can gain access to the roof. If they show their temper while manipulating, give them more smoke, but remember that the smoke is not to stupify the bees, but only to alarm. If stung, and this will occasionally happen, remove the sting as soon as possible, and apply anything that will destroy the odour of the bee poison, the smell of which irritates the bees greatly. Many remedies are advocated for stings, but no particular one can be recommended, for what suits one constitution may have a contrary effect on another. The application of ammonia, tobacco, or soda will generally allay the momentary pain.

We might observe in closing this part of the subject that carbolic acid is a very powerful intimidant which in the hands of the expert is very efficacious, but its use by the inexperienced is not recommended.

CHAPTER XIV.

Obtaining a Swarm and Placing in a Frame Hive.

Natural swarms are obtainable in some districts at almost any time of the year. It will be the better plan for the beginner to make a commencement in the spring. If the purchase is made in the autumn, the swarm should be a strong one, and if the weather is not sufficiently mild to enable the bees to take advantage of the autumn flowers, considerable feeding will be required.

There are several ways of placing a swarm in a frame hive. We shall describe what we consider the simplest and most reliable for the novice, and other ways to meet special circumstances as will suggest themselves to him as he gains experience. Having purchased a swarm which will be received from the dealer in a well-ventilated box, stand it near the proposed position for new hive, where it will remain unmolested until near sundown. If the day is hot, don't forget to shade the box in the interval. Towards the time mentioned, bring the frame hive to its permanent position. It is important to see that the hive stands perfectly level, or the frames will not hang perpendicular, consequently the combs when built will encroach on each other, and the advantages of the movable frame system be nullified. Observe that all the ends of frames are in contact; the frames will be fitted with foundation sheets or starters. If a few empty combs are available, they may be placed in the centre, and if a frame containing young brood and honey can be spared from another hive, so much the better. Adhere closely to the following instructions,

with intelligent management afterwards, and you will rarely have occasion to say your bees deserted their hive. It is badly-designed hives, bad management, and continually stealing every ounce of honey from the hive, frequently leaving the bees in a state of semi-starvation that cause them to forsake their quarters and their ever-meddlesome owners for a habitat more congenial to their security and comfort. But we are digressing. To return to the hive. If the body box is separate from the floor board, and the latter on legs as recommended, wedge up the front of body about an inch, or open the entrance to its full extent. Now place a board about the width of hive, and extending to the ground about 3 feet in front of the hive, with a gradual slope up to the entrance. Cover this

HIVING A SWARM.

inclined plane with a tablecloth or other suitable material that will give the bees good foothold. Take the top edge of cloth tight across the front of hive under the wedges supporting body box, making all irregularities as even as possible. These may appear mere matters of detail, but they are nevertheless important. Observe that quilts are in position, and no openings left for bees to get beyond division boards. Everything now prepared, carefully lift the box containing swarm, after removing the part made to open; hold the box over the cloth about a foot from the entrance, and giving it a sudden jerk, the bees will fall on to the cloth. In a few minutes, having recovered from their momentary surprise, a movement will be made towards the hive. The advance guard having

inspected and satisfied themselves with the arrangements within, will commence fanning vigorously at the entrance, this being the signal to advance and take possession. A gentle hum passes round, so well known to the apiarist as a sound of contentment, and the scramble begins. A more interesting sight to the bee-keeper, next to swarming, will seldom be witnessed. In a short space of time, some ten to fifteen minutes, varying with the temperature, this merry company, perhaps some twenty thousand or more in number, will have passed the portals of their new home, attracted to one centre, their mother and queen. If the queen is seen, she may be assisted to the entrance, which will accelerate the run in. When all are safely domiciled and free from the lower edges of side walls, the body box may be let down, and hiving apparatus cleared away. Next morning quietly examine the hive from the back, remove any frames not occupied by bees, reserving them behind the division board for a few days, and adjust entrance. Should the weather suddenly become unpropitious, a little judicious feeding will be desirable. If there is any fear that the swarm may abscond, the entrance may be covered with queen excluder zinc for a few days. Of course, it is understood that in this case the queen accompanying swarm is fertilized.

CHAPTER XV.

Driving and Transferring.

This is a process by which a colony of bees and their combs can be removed from any of the unmanageable contrivances in which bees have been most generally kept in this country: be it the favoured paraffine box, beer case, or tar-barrel, for which some have expressed such fond admiration. The laudation of one or the other of these familiar domiciles is generally the result of one or more of the following misfortunes: Prejudice against frame hives as being something new, for the want of a better understanding of the principles of its management; or ignorance of the ways and requirements of bees.

It has been stated by a section of South African bee-keepers that the native bees are content to dwell and thrive in any of the rickety domiciles above mentioned, but when transferred to a movable comb hive they become discontented and soon desert it. Could anything be more absurd? As the writer is an advocate of frame hives as being far and away the best home for the honey bee, it will be as well to just touch upon these rash assertions in passing. We are not prepared to say that bees always work on invariable lines or by scientific rules, for it is well known to bee-keepers living in different parts of the world that this is not so. But we make bold to say that in 90 per cent. of the cases in which bees have forsaken frame hives, it has been due to the lack of knowledge about bees on the part of their owner, or unsuitable hives have been used; and in the remaining 10 per cent. of cases, for reasons not far to seek. They would have deserted any other of the before mentioned, old-fashioned domiciles, in exactly the same way.

The conditions to be primarily observed in placing a lot of driven bees or a swarm, for the matter of that, in a frame hive, are as follows: The queen must be present, and the new hive provided with some comb containing young brood and stores, and they should be fed until natural sources abound.

Having satisfied ourselves that bees will live and do better in frame hives than in the antiquated tar-barrel, we will proceed with the business of removing them from the old domicile to a modern hive. The operation is not difficult, and as an example, we will suppose that we have one of the old-fashioned type to deal with; say a paraffine box, with fairly straight combs, principally worker size. Having selected the afternoon of a fine day—not too hot—proceed as follows:—

Provide a bench or table of some description, placing it some twenty or thirty yards from the stand occupied by the box it is proposed to drive. Obtain in addition two boxes, one of which must be of sufficient capacity to hold the bees when driven, a carving knife, or better still a piece of stout iron hoop, one end being turned, three or four slips of wood about 16 inches long and about 3 inches by ¾ inch, a few wire nails, a light dusting brush or a few feathers, two light hammers and a chisel. This

DRIVING BEES.

will be the complement for driving. For transferring the combs, provide another table, or the same one can be used, removing it to another position after the driving operation; also two or three skeins of tape (narrow), and a piece of some soft material about 16 inches square. A sharp knife will also be wanted, and the new body box and empty frames. An assistant will be of great service to you. Having everything in readiness, light the smoker; next approach the box about to be dealt with, giving a few puffs at the entrance. Having given the bees a few minutes to "gorge," carry the box to the driving table, turning it upside down or on end in such a way that the ends of the combs will be brought uppermost, and the top of box to which they are attached must now be the side directly opposite, and most distant from, the operator. Give a little more smoke amongst the combs while your assistant places one of the empty boxes on the old stand to receive the bees returning from the veld.

Next let him steady the other box above the one to be driven reversed, and resting its lower edge on the back edge of same, while you make it secure with the slips of wood and nails. Elevate the front edge in fixing at an angle that will allow you a good view of the inside of both boxes. In this position it will form a hood to receive the bees as they vacate their old abode. By this time you will find them crowding to the tops of the combs. Take the two hammers, or, with the hands, commence to rap the sides of the lower box sufficiently hard to jar the combs, but not to break them. Very soon the terrified bees will be seen making for the top box. Keep up a continuous rapping, and a sharp look out for the queen. As soon as she ascends to the box above you can accelerate the strokes, while your assistant commences to cut out the combs, breaking up the box as he proceeds, if necessary. As soon as the bees have clustered above, which will take from ten to thirty minutes, varying with the temperature, unfix the box containing them, placing it on the old stand, having first removed the box temporarily occupying it. This latter can be placed on the ground, when the few bees that may have collected there will quickly rejoin the driven ones on the stand. The next procedure will be that of transferring the combs to the frame hive. Perform this operation with care, yet as quickly as possible. Do not chill the brood, and be particular not to injure the brood, especially that sealed. On the soft material provided, lay three pieces of tape long enough to tie round a frame. Upon these lay a brood comb, now take a frame, placing the top bar towards the top of comb, cutting the comb to fit it; next tie the ends of tape above top bar, bringing the frame to the upright position; place this in centre of hive, treat each comb in a similar manner, leaving those containing honey until the last. Some of the honey combs can be retained, if there should be more than necessary for the bees' use; reject all uneven and irregular combs. In rearranging the combs in new hive, place those containing honey only to the outside, keeping the brood combs as near the original position as possible; if the colony is a strong one, and season of year will admit, one or two frames with full sheets of foundation can be dropped down between the brood combs; these will be rapidly drawn out and filled with eggs.

The next thing will be to bring the new hive to the old stand, unless a more desirable position can be found. Prepare the hive and inclined board for the reception of bees as described in Chapter XIV., under the head of placing a swarm in frame hive. Having done this, shake the bees down in front, when they will at once run in and cover the brood, and in a few days' time their owner will be gratified to observe that they appreciate the change as much as himself.

In five or six days the bees will have made the old combs secure to the frames; the tapes can then be cut at the top and gently withdrawn. If left, the bees will eventually remove them, but this gives a lot of unnecessary trouble to the industrious little labourers.

CHAPTER XVI.

Swarming.

As previously pointed out, swarming is the natural method of increase. Where the bee-keeper wishes to add to his stock, this may be done by allowing his bees to swarm naturally, or by making an artificial swarm, which is more properly called "dividing." We shall speak of

natural swarming first. In this country natural swarms make their exit at very uncertain periods, varying in different districts, and mainly dependent upon the time of rainfall and appearance of local flora. On the approach of weather favourable to the production of honey, rapid progress is made with brood rearing, and the hive becomes densely populated. At this time, drones will be flying freely, and if the hive is examined, queen cells will be noticed in course of construction. Should any be scaled over, it is probable that the swarm will issue during the next two or three days, weather permitting. The bee-keeper should, therefore, be on the alert, having everything in readiness to receive the swarm. A box, somewhat over a cubic foot in capacity, or a straw skep, should be handy to hive the bees in, a board for making the inclined road to the entrance, and the white cloth already mentioned. The veil and smoker should be prepared; and last, but not least, the hive in which to place the bees should be prepared and fitted ready to receive them. A close watch should be kept, as swarms leave the hives surprisingly quickly, the time of day being usually between 10 a.m. and 4 p.m. When it is decided to leave, those going fill their honey sacks with a three days' supply, and at a given signal the whole company commence to pour out of the entrance almost frantic with excitement, thousands upon thousands careering in circles as they rise, until the surrounding atmosphere seems alive with bees. No one can mistake their intention. In a short time this noisy multitude begin to concentrate, usually selecting some neighbouring shrub or bush to alight on. The cluster grows rapidly, and in a short time the swarm is ready for the owner to hive. This cannot be taken as the invariable rule of procedure; it sometimes happens that the exodus takes place while the queen cells are only in course of formation; at other times the queen fails to accompany them. When this is the case they are much longer on the wing, and if they cluster, soon become restless, and eventually return to the parent hive Very frequently two or more swarms issue at the same time from different hives and may collect together. If there is any inclination to move off noticed, sand thrown in the air amongst them, or a spraying with water from a garden hose or syringe will cause them to collect with greater speed. The process known as "tanging the bees," whether performed with a bell or the housemaid's unmusical fire shovel, is quite useless, and beyond giving a little exercise to the individual performing, and probably disturbing the neighbours, it has no other effect.

Clipping Queen's Wings.—Some bee-keepers clip the queen's wings to prevent swarms absconding; and although largely practised in America, we could never see that it was of much advantage in this country. True, a swarm will occasionally make off, but very often queens with clipped wings, in trying to accompany the swarm, fall from the alighting board, and are lost for ever in the growth of vegetation around the hive, or are at once pounced upon by one of the numerous enemies of bees usually found lurking in South African apiaries for what they can pick up. The loss of a queen in this way, unless observed by the bee-keeper, causes a lot of confusion in an apiary. It is also a very unreliable method—in this way: South African bees frequently supersede their queens unknown to their owner, and without asking his permission. So he is never quite sure of picking his queen up outside the hive, and whistling or calling the swarm back like our American friends. However, if clipping is to be practised, great care must be exercised in handling the queen, or serious damage may be done to her. She should be held by the thorax with the thumb and first finger, while the wings on one side of the body are reduced in length with a pair of sharp scissors, care being taken not to cut too low, and avoid compressing the abdomen in any way.

To return to the swarm, which is now quietly settled. The position of the swarm when clustered will decide what means best to use to gain possession of it. No rule can be given suitable to every case, as bees are not particular to always select a spot convenient to their owner; and very often his ingenuity will be in request. A swarm very frequently alights on an outstretched branch within easy reach, hanging something like a huge bunch of grapes; in this case their dislodgement will be a simple matter. First spread the cloth on the ground under the cluster, now hold the box close under the swarm and give the branch a sharp jerk, this will precipitate the swarm into the box; reverse it, open side downward on the cloth provided, one side of the box being wedged up an inch or so. As soon as the stragglers have collected, remove the box to the position it is intended the new hive shall occupy. Shade the swarm, and leave with freedom of flight till near sundown. If the swarm should settle in a bush or the middle of a thorn hedge, where it is impossible to shake the bees off, place the box open side downwards, above and as near to the cluster as possible, then gently drive the bees towards it with the smoker; a small piece of honeycomb fixed to the top of the box will often tempt them to enter more quickly.

Taking a Swarm—Cutting off a small branch with bees (Transvaal).

Sometimes the swarm alights on a branch which can be conveniently removed with the bees; the swarm can then be shaken down in front of the frame hive without further trouble. This is the proceeding being adopted by the ladies in the accompanying illustration. Should the bees cluster on the twigs of a low bush, their weight bending it to the ground, shake them off, holding the swarming box in readiness, and as soon as they are on the cloth, place the box over them, blocking up one side as before directed. A swarm sometimes settles on the stem or trunk of a tree; in this case it will be best to brush the bees into the box with a few feathers or a light dusting brush.

(*To be continued.*)

THE AGRICULTURAL SOILS OF CAPE COLONY.

INVESTIGATION AND ANALYSES.

By C. F. Juritz, M.A., D.Sc., F.I.C.

(*Continued from Page 45.*)

Method I.—Standard Method of Soil Extraction with Hydrochloric Acid.

Two hundred grammes of the air-dried "fine earth"* are placed in a large rubber-stoppered flask, and treated with 400 c.c. of hydrochloric acid of specific gravity 1·115 (plus any needed for neutralising carbonates in the soil); allowed to remain for five days at the ordinary temperature, shaking thoroughly from time to time. After the prescribed period of digestion has expired, the extract is filtered, through a dry pleated filter, into a dry flask. 250 c.c. of the clear filtrate, representing 125 grammes of soil, are evaporated to dryness in a shallow porcelain dish, at first over a small open flame, then on the water bath, and finally on a sand bath, or in an air oven, at 120°C, until perfectly dry. During the evaporation a few cubic centimetres of strong nitric acid are added to the extract. The dry residue is moistened with strong nitric acid, and again evaporated to dryness; to expel the nitric acid, the residue is moistened with hydrochloric acid, and evaporated on the water bath to as near dryness as possible, taking care to stir towards the end of the evaporation, so as to prevent the formation of crusts. This final residue, after warming in the air bath for an hour at 105°C to 110°C, is treated with warm water and a 20 per cent. solution of hydrochloric acid, and is then washed over into a 250 c.c. flask, boiled for 15 minutes, allowed to cool, filled up to the mark with distilled water, and filtered into a suitable bottle. This filtered soil extract is then employed for the actual estimations of lime and potash.

* As more than once indicated, only soil grains below a certain size are included in the material submitted to extraction. Loughridge (Proceedings of the American Association for the Advancement of Science, Vol. 22. p. 81) has found that, of all the grades into which soils are usually separated by mechanical analysis, the "clay," *i.e.* the finest grade, is by far the richest in mineral constituents, and that the quantity of acid-extractible matter in the grades of soil particles of over ·04 mm. diameter was practically negligible Hence it follows that soil sifted through a ½ mm. sieve will contain all the mineral constituents available for plants. The first requisite in selecting a standard method is to utilise for extraction only the soil passing the ½ mm. sieve. Hence, too, the method *e.g.* of sifting the soil through a 3 mm. sieve and pounding the sifted portion for extraction must be rejected as furnishing misleading results.

Determination of Lime.—50 c.c. of the extract (equivalent to 25 grammes of "fine earth"), obtained as described in the preceding paragraph, are removed, by means of a pipette, into a 250 c.c. boiling flask: after adding two or three drops of rosolic acid solution (made by dissolving one gramme of rosolic acid crystals in 100 c.c. of 96 per cent. alcohol), ammonia is added, very cautiously, by means of a dropping tube, until a permanent pinkish colour is produced in the supernatant liquid. The mixture is then boiled until the pink colour almost disappears again, the alumina and oxide of iron being thus precipitated. After cooling, the flask is filled up to the mark, thoroughly shaken, and the contents filtered into a 300 c.c. bottle. 100 c.c. of this clear filtrate (equal to 10 grammes of fine earth) are removed by a pipette into a 300 c.c. Erlenmeyer flask; three to five drops of acetic acid are added, which should render the mixture feebly acid; the liquid is then heated to near boiling, and treated with 20 c.c. of a four per cent. ammonium oxalate solution. The mixture is placed on a water oven for six hours, and the precipitate is then collected, ignited, weighed, and the lime calculated as CaO.

Determination of Potash.—Other 50 c.c. of the filtered soil extract (equivalent to 25 grammes of fine earth) are placed in a 300 c.c. Erlenmeyer flask and boiled. 5 c.c. of a ten per cent. Barium chloride solution are added, and the mixture is boiled for another five minutes for the precipitation of sulphates as Barium sulphate. After filtering into a marked 250 c.c. flask, a few drops of rosolic acid are added, and boiling with ammonia is proceeded with as in the case of the lime determination. When partly cooled down, two or three grammes of crystalline ammonium carbonate are thrown in, and the temperature is once more raised to the boiling point, in order to separate calcium and barium. After complete precipitation of these, the liquid is cooled, the flask filled up to the mark with distilled water, and the contents filtered. Of this filtrate 100 c.c. equivalent to 10 grammes* of fine earth) are placed in a platinum basin, and evaporated to dryness on a water bath. The dish containing the residue is heated, at first on asbestos sheet, and then carefully over a small open flame, until all ammonium salts have been expelled. By means of boiling water the residue is then washed through a filter into a glass dish: 2 c.c. of a 10 per cent. solution of platinic chloride are added, and the mixture is evaporated to dryness on the water bath. After cooling, some dilute alcohol (81 to 82 per cent.) is added to the residue, and it is allowed to stand for at least half an hour. It is now filtered through a Gooch crucible by the aid of a filter pump, washed, at first, with 96 per cent., and then with absolute alcohol, and dried for two hours in a water oven. The weight of the crucible containing the Potassium platino-chloride having been taken, the precipitate is washed through the filter with boiling water, and the crucible, after again washing with alcohol, is dried and weighed. The difference between the two weighings, multiplied by ·193, gives the quantity of potash (K_2O) in the ten grammes of fine earth taken.

Determination of Phosphoric oxide.—25 grammes of fine earth are placed in a marked 500 c.c. flask, 25 c.c. of concentrated nitric acid are added, and the mixture is thoroughly shaken. 50 c.c. of concentrated sulphuric acid are next added, and the mixture is again carefully shaken up. It is then gently heated, shaking at frequent intervals. If this does not lead to complete oxidation, more nitric acid is added, and the heating continued. Finally the mixture is cooled, and diluted to the mark with distilled water; it is then well shaken and filtered. 200 c.c. of the filtrate (equivalent to ten grammes of fine earth) are placed in an Erlenmeyer flask of suitable size, and very nearly neutralised with strong

* In the citric acid extraction process (see post) this quantity will be equivalent to 20 grammes of the soil taken.

ammonia solution, a few drops of nitric acid being used to solidify the mixture in case the limit is overstepped. 200 c.c. of Molybdic solution—prepared by dissolving 150 grammes of ammonium molybdate in a litre of water, and, when completely cool, adding this to a litre of nitric acid of specific gravity 1·20—are added, and the mixture is heated to a temperature of 50°C for three hours in a water oven, and allowed to cool completely. The liquid is decanted through a small filter, and the precipitate remaining in the flask repeatedly washed with diluted (1 : 1) molybdic solution. It is then dissolved, on the filter, with warm 50 per cent. ammonia, and to the resulting solution, while still warm, hydrochloric acid is added at once, but gradually, until the precipitate at first formed dissolves only after long agitation. After cooling 20 c.c. of Magnesia mixture* are added from a burette, drop by drop, at the rate of one drop every five seconds, and then 25 c.c. of 5 per cent. ammonia. The mixture is allowed to stand for twelve hours at least, after which the precipitate is collected in a weighed Gooch crucible, and washed with 5 per cent. ammonia. It is then dried on an heated iron plate, and ignited in a furnace for fifteen minutes. The crucible is then cooled and weighed with the magnesium pyrophosphate.

METHOD II.—HYDROCHLORIC ACID EXTRACTION AS PRACTISED BY THE GERMAN EXPERIMENT STATION.†

To 200 grammes of dry-sifted "true soil" are added 400 c.c. of a 25 per cent. hydrochloric acid solution, the quantity of acid being increased, if necessary, when the soil contains an excess of carbonates. The mixture is allowed to stand at the ordinary temperature for 48 hours, with frequent shaking, and is then filtered.

Determinations of lime and potash are made in definite quantities of the filtered extract (prepared as in Method I), exactly as in the first method.

Determination of Phosphoric oxide.—20 c.c. of the filtered extract (which has been treated in a similar manner to the extract in Method I), equivalent to 10 grammes of "true soil," are placed in a dish and evaporated almost to dryness. The residue is taken up with a little nitric acid, washed into a suitable Erlenmeyer flask, and nearly neutralised by means of strong ammonia solution, a few drops of nitric acid being used to acidify the mixture should the neutral point be passed. Molybdic solution is then added, and the rest of the process conducted as in the first method.

METHOD III.—EXTRACTION OF IGNITED SOIL BY MEANS OF HYDROCHLORIC ACID, AIDED BY NITRIC ACID. (MAERCKER'S METHOD.)

Twenty grammes of "fine earth" are weighed in a platinum dish, and heated on asbestos wire gauze until all organic matter has been expelled. The dish is then cooled and the contents carefully transferred by the aid of a brush into a porcelain dish. 100 c.c. of concentrated hydrochloric acid and 10 c.c. of concentrated nitric acid are now added, and the mixture is evaporated on a water bath, and dried for three hours at 120° C. Warm water is next added, together with some dilute hydrochloric acid, and the whole is washed into a marked 500 c.c. flask, in which it is boiled for 15 minutes. The mixture is then cooled, filled up to the mark with distilled water, and filtered.

---

* This Magnesia mixture is prepared by dissolving 110 grammes of magnesium chloride, and 210 grammes of ammonium chloride, in 700 c.c. of 24% ammonia solution filtering the mixture, if turbid, and diluting with distilled water to two litres.

† Land. Versuchsstat, Vol. 38, p. 311.

Determination of Lime.—100 c.c. of the filtered extract (equivalent to four grammes of fine earth) are placed in a 200 c.c flask, two or three drops of rosolic acid are added, and the determination is proceeded with similarly to that in Method I.

Determination of Potash.—Other 100 c.c. of the filtered extract (equivalent to four grammes of fine earth) are boiled in a 300 c.c. Erlenmeyer flask, and 5 c.c. of a ten per cent. solution of barium chloride are added, after which the determination is continued as in the first method.

Phosphoric oxide is determined exactly as in Method I.

METHOD IV.—EXTRACTION BY HYDROCHLORIC ACID AT STEAM TEMPERATURE. (HILGARD'S AND LOUGHRIDGE'S METHOD.)

Fifty grammes of air-dried "fine earth" are placed in a porcelain beaker of sufficient size, 500 c.c. of hydrochloric acid of 1·115 specific gravity are added, and 2 c.c. of nitric acid, and, after covering the beaker with a clock glass, the mixture is digested on the steam bath for five days. The solution is then filtered, the residual earth is thoroughly washed with distilled water, the filtrate and washings are evaporated to dryness, as in Method I, with nitric acid in a shallow porcelain dish, and finally made up to 250 c.c.

Determination of Lime.—100 c.c. of the extract (equivalent to 20 grammes of fine earth) are placed in a 200 c.c. boiling flask, and precipitated by ammonia, as in Method I; the flask is then filled up to the mark with distilled water, and the contents filtered. 100 c.c. of the filtrate (equivalent to 10 grammes of fine earth) are precipitated with ammonia oxalate, as in Method I.

Determination of Potash.—100 c.c. of the extract (equivalent to 20 grammes of fine earth) are treated with barium chloride solution in the same way as in Method I, and filtered into a 200 c.c. flask; after passing through the usual processes 100 c.c. of this (equivalent to 10 grammes of fine earth) are taken, as in Method I, for the actual potash determination.

METHOD V.—EXTRACTION OF THE SOIL BY MEANS OF CITRIC ACID. (DYER'S METHOD.)

The solution here used is that recommended by Dr. Bernard Dyer, in the "Journal of the Chemical Society," March, 1894, p. 141, which is an adaptation of that previously used at the Halle Experiment Station, and published by Maercker and Gerlach in 1892. In a rubber-stoppered three litre flask are placed 200 grammes of dry-sifted "true soil" (*i.e.*, as sifted through a 3 mm. sieve), together with two litres of distilled water containing in solution 20 grammes of pure citric acid. This solution is left in contact with the soil, at the ordinary temperature, for seven days, shaking the mixture thoroughly about fifty to sixty times each day. At the end of the seven days the solution is filtered, by the aid of a filter pump, through a porcelain funnel with a flat perforated base, or through a Berkefeld candle filter; 500 c.c. of the filtrate would be required for each of the determinations described below.

Determination of Lime.—500 c.c. of the filtered soil extract (equivalent to 50 grammes of soil) are placed in a 1,000 c.c. flask, and a few drops of rosolic acid are added, followed by ammonia, as in the previously described lime determinations. The mixture is boiled, and, after filling to the mark, it is filtered, and 500 c.c. of the filtrate, equivalent to 25 grammes of soil, are warmed with a few drops of acetic acid in an Erlenmeyer flask, and then treated with 50 c.c. of 4 per cent. ammonium oxalate solution, the precipitate being collected, as before, after warming for six hours.

Determination of Potash.—500 c.c. of the filtered extract (equivalent to 50 grammes of soil) are evaporated to dryness in a platinum dish, and cautiously ignited. The residue left in the dish is dissolved in hydrochloric acid, filtered into a 300 c.c. Erlenmeyer flask, and boiled. 5 c.c. of 10 per cent. barium chloride solution are added, and the determination is proceeded with as in the method already described in connection with the extraction by hydrochloric acid.

Determination of Phosphoric Oxide.—500 c.c. of the filtered soil extract (corresponding to 50 grammes of true soil) are evaporated to dryness in a platinum dish, carefully ignited, and taken up with hydrochloric acid, again evaporated, ignited, and extracted with hydrochloric acid; the extract is filtered and washed, and the filtrate and washings concentrated. The concentrated solution is allowed to cool, and then 200 c.c. of a solution of ammonium molybdate in nitric acid—prepared as already described—are added, and the rest of the procedure outlined under the method of determining phosphoric oxide in the "fine earth" (see method I.) is followed.

It now becomes a matter of interest and importance to agree upon the interpretations that are to be placed upon the figures obtained by analysis from a soil that has been extracted according to one of the foregoing methods. In this Colony absolutely no investigations have yet been made to show what quantities of plant food are necessary in order to render fertile a soil that is in other respects well circumstanced; for it must be remembered that a brack or arid soil, or one physically unfit for cultivation, cannot be otherwise than unproductive even when it is amply supplied with the needful chemical constituents.

Maercker, of the Halle Experiment Station, graded soils, on the plant food basis, as follows, the extraction being made with strong acid:—

	Potash %	Phosphoric oxide %	Lime % in clay soils.	Lime % in sandy soils.	Nitrogen %
Poor	< ·05	< ·05	< ·10	< ·05	< ·05
Medium ...	·05 — ·15	·05 — ·10	·10 — ·25	·05 — ·15	·05 — ·10
Normal ...	·15 — ·25	·10 — ·15	·25 — ·50	·15 — ·20	·10 — ·15
Good	·25 — ·40	·15 — ·25	·50 — 1·00	·20 — ·30	·15 — ·25
Rich	> ·40	> ·25	> 1·00	> ·30	> ·25

This classification Professor Hilgard declares to be in remarkable agreement with his own, with the proviso that, in the presence of high lime percentages, relatively low proportions of phosphoric oxide and potash may, nevertheless, prove adequate. Many of the results tabulated in the following pages may incidentally throw light upon the subject, but until it has been directly investigated, and sufficiently so to enable limits to be laid down for different parts of this Colony, it will probably prove most convenient and satisfactory provisionally to judge of soils by Maercker's limits, and such, in fact, has been my practice hitherto, nor has it, as already observed, been found to lead to conclusions inconsistent with practical experience.

According to Dyer's investigations, a soil extracted with his citric acid solution is normally supplied with potash and phosphoric oxide when the former shows ·005, and the latter ·010 per cent. The investigations upon which these conclusions were based, it should, however, be said, had been conducted upon well-studied and productive soils at Rothamsted.

Just here one point calls for special emphasis: Liebig enunciated the law that the growth and development of plants is regulated by the amount of that particular plant food constituent which is present in the soil in smallest proportion: if one element of plant food is deficient in the soil, no excess, however great, of any of the others will atone for the defect. If a soil contain abundance of lime, potash, and nitrogen, but lacks phosphoric oxide, no crop can reach perfection. Liebig's law of the minimum, thus briefly set forth, must now be extended so as to fill our widened vision. We know that, chemically, a soil may be all that is desired, and yet prove unproductive; a mechanical analysis may elucidate the cause of this; or, if that too result satisfactorily, the soil may be otherwise physically defective, for instance, in porosity; or perhaps it may lack moisture. The various chemical constituents of plant food do not comprise the *whole* chain of contingencies upon which a soil's fertility, and still less its productiveness, depends, but they *do* form links in that chain, and, as the strength of a chain is measured by that of its weakest link, so the potential fertility of a soil well provided chemically may be dependent upon, and therefore limited by, defects along other lines. Hence chemical analysis does not test the strength of the *chain*, but only that of *certain of its links*. The fact that the links thus tested prove to be sound does not render the entire chain sound. A soil which yields to acid extraction a large reserve stock of all plant food constituents may be deficient in other respects: even if physical unfitness or alkalinity do not affect its fertility, defective water supply, or unfavourable situation, or many other agencies, may cause it to be unproductive,* no matter how fertile it may be. On the other hand, if by chemical analysis certain links in this chain are found to be defective, then, no matter how excellent the condition of the remaining links, the defects must be remedied ere the chain can be fit for use.

The results of the analyses detailed in the sequel show that there are many soils in the Colony which are thus weak in certain respects, and if the investigations here described do no more than point out the districts and areas where such weakness exists, they will have served a useful purpose. A chemically-poor soil invariably needs working up, and such investigations as these can show where soils answering to that description

* "Fertility and crop production are different terms. Fertility is a property inherent in the soil: it is what the soil is capable of doing if it is under the best possible conditions. The yield of crops, on the other hand, is not dependent upon the fertility alone. . . . If your seed is not properly selected, if your planting season is too early or too late, if the soil is not properly cultivated, if the climatic conditions are not favourable, your crop yield may be affected, but the fertility of the soil—that inherent power of the soil, under the best conditions, to produce a crop—will not necessarily be impaired." (Whitney: "Soil Fertility," 1906, pp. 5, 6.

"The productivity of a given piece of land depends upon a large number of agencies, any one of which may be the limiting factor in the crop yield. We may enumerate, for example, temperature and water supply, both determined by the climate, by the natural physical structure of the soil, and by modifications in its texture induced by cultivation; there are, further, the aëration and the actual texture of the soil, the initial supply of plant food of various kinds, and, again, the rate at which this last item is rendered available to the plant by bacterial action or by purely physical agencies. All these factors interact upon one another, to all of them, and not merely to the nutrient constituents does Liebig's law of the minimum apply, so that any one may become the limiting factor and alone determine the yield. It is of no use, for example, to increase the phosphoric acid content of a soil, however deficient it may be, if the maximum crop is being grown that is consistent with the water supply, or if the growth of the plant is being limited by insufficient root range caused by bad texture and the lack of aëration in the soil." (A. D Hall: "Recent Developments in Agricultural Science." Brit. Assn. Rep., 1905, p. 275.)

are to be found. The fact that soils rich in plant food* are not invariably fertile, or, if fertile, do not produce an adequate return, is no argument against the worth of analysis. In brief, chemical analysis can designate bad soils even if it does not aim at pointing out good ones; and yet even this it is at times capable of doing, as the following analyses more than once witness. Hilgard may here again be quoted. He says:—†

"It seems to be generally true that virgin soils showing high percentages of plant food, as ascertained by extraction with strong acids (such as hydrochloric, nitric, etc.), invariably prove highly productive: provided only that extreme physical characters do not interfere with normal plant growth, as is sometimes the case with heavy crops or very coarse sandy lands. *To this rule no exception has thus far been found.*"

Field Operations.

Professor Whitney, Chief of the Division of Soils in the United States Department of Agriculture, opened his report on the field operations of his Division during 1899 with these words:—

"During the season of 1899 three well-organised parties were in the field for from six to eight months, each equipped according to the most modern methods for surveying investigations and mapping the soils of several important agricultural districts."

That division was established in 1894, with a personnel of 10 persons; by the end of 1904 the number had increased to 127. Up to the middle of 1900 about 3,500 square miles of country had been mapped out in connection with the soil survey; within the succeeding four and a half years 85,500 square miles had been mapped, a fact which shows the rapid increase in the work of an institution that commenced operations a year after our own soil investigations had been started.

At no time have we, in this Colony, been able to spare more than one solitary unassisted individual for both field operations and laboratory work in connection with our soil investigations, so that, while the collection of samples was going on the operations in the laboratory had to cease, and *vice versa*. This is a circumstance that must be continuously borne in mind to account for the comparative paucity of result hitherto obtained.

The equipment of the soil collector has, as a rule, been little else than a stock of canvas bags, a spade, a supply of census maps of each district traversed, a small pocket compass, and a trocheameter. By the aid of these implements samples have been taken from some 27,000 square miles of country.

The soils whose analyses are tabulated in the following pages fall into three classes according to the circumstances of their collection:—

(1) First of all must be mentioned the specimens taken in pursuance of the survey scheme to which reference has already been made. In each case these samples were collected by one of the analysts attached to the Government Analytical Laboratory, who had been specially detailed for

* *i.e.*, yielding large proportions to strong hydrochloric acid.
† *Op. cit.*, p. 343.

the work. The following is a list of the samples so taken from each of the Divisions of the Colony visited for the purpose:—

Division.	No. of samples collected.	Area of Division in square miles.
Cape	25	663
Malmesbury	54	2,329
Caledon	30	1,772
Bredasdorp	21	1,577
Swellendam	37	2,362
Robertson	27	1,526
Riversdale	24	1,712
Mossel Bay	17	707
George	19	979
Knysna	13	810
Uniondale	12	1,690
Oudtshoorn	19	1,653
Worcester	30	2,623
Ladismith	16	1,256
Paarl	23	610
Komgha	27	546
Cathcart	28	995
Queenstown	4	1,749
Butterworth	7	311
Idutywa	1	—
Willowvale	4	—
St. Marks'	4	471

The total area from which these 442 samples of soil were collected embraces about 27,000 square miles, *i.e.*, about one-tenth of the entire Colony, so that, on an average, one sample was taken from every sixty square miles of country.

(2) Apart from this scheme of soil investigation, samples were taken from time to time, at various spots of special interest, as occasion offered, by one or other of the analytical staff, while advantage was taken of sundry journeys into different parts of the country by Mr. A. C. MacDonald, subsequently Assistant Director of Agriculture in the Transvaal, Dr. E. A. Nobbs, and other officials of the Agricultural Department, to procure additional specimens. Means were thus afforded for the analysis of many soils collected within the following Divisions of the Colony:—Albany, Aliwal North, Barkly West, Cape, Gordonia, Hopetown, Humansdorp, Kenhardt, Kimberley, Prieska, Robertson, Somerset East, Stellenbosch, Steynsburg, Taungs, and Tulbagh.

(3) We are also indebted for the collection of many of the samples whose analyses appear in the following tables to unofficial persons, farmers and others, who, in many cases, kindly responded to requests conveyed to them to send specimens of particular soils which, for some reason or another, it was thought desirable to analyse. For several reasons, most of which are obvious, it is not possible to give as much detail regarding these soils as in the case of those collected in pursuance of the systematic survey scheme. Amongst the soils which were thus procured were samples from the following Divisions:—Albert, Barkly West, Beaufort West, Bredasdorp, Caledon, Cape, Ceres, Clanwilliam, Colesberg, Elliot-Slang River, Fort Beaufort, George, Graaff-Reinet, Hanover, Kenhardt, Kimberley, King William's Town, Knysna, Kuruman, Maclear, Mafeking, Malmesbury, Mossel Bay, Mount Currie, Mount Frere, Namaqualand, Paarl, Piquetberg, Port St. John's, Queenstown, Richmond, Robertson, Stellenbosch, Steynsburg, Stockenstrom, Tulbagh, Uitenhage, Umtata, Umzimkulu, Victoria East, Vryburg, Willowmore, and Worcester.

The soils included under this category have been separately tabulated and are distinguished from the others by being marked "privately collected," inasmuch as it has not always been absolutely certain that in every case the samples so taken, however specific previous instruction on the point may have been, were thoroughly representative, or that they were collected in the manner officially prescribed. For these reasons the soils known to have been taken according to the specific directions have been distinguished as "officially collected."

PART III.—RESULTS OF CHEMICAL ANALYSES.

It may be convenient at this stage, before passing on to enumerate in detail the actual analytical results arrived at, to tabulate the soils examined, grouping them according to the various divisions and districts of the Colony whence they were collected. and in regard to the particular methods by which they were analysed; this is done in the list below:—

Division or District.	Method I., Standard.	Method II., German.	Method III., Maercker's.	Method IV., Hilgard's.	Method V., Dyer's.	Total.
Albany	—	3†	—	—	3†*	3
Albert	3	—	—	—	—	3
Aliwal North	4	—	—	—	—	4
Barkly West	13	—	—	—		13
Beaufort West	1	—	—	—	—	1
Bredasdorp	1	21	—	—	—	22
Butterworth	7	—	—	—	—	7
Caledon	6	34	—	—	—	40
Cape	23	46	—	—	—	69
Cathcart	28	—	—	—	—	28
Ceres	7	—	—	—	—	7
Clanwilliam	—	7	—	—	—	7
Colesberg	6	—	—	—	—	6
Elliot-Slang River	4	—	—	—	—	4
Fort Beaufort	4	—	—	—	—	4
George	20	6	3	—	—	29
Gordonia	2	—	—	—	—	2
Graaff-Reinet	3	—	—	—	—	3
Hanover	—	6	—	—	—	6
Herbert	3†	—	—	—	3†	3
Hopetown	2	—	—	—	—	2
Humansdorp	—	4	—	—	—	4
Idutywa	1	—	—	—	—	1
Kenhardt	4	1	—	—	—	5
Kimberley	6	2	—	—	—	8
King William's Town	1	—	—	—	—	1
Knysna	16	3	—	—	—	19
Komgha	27	—	—	—	—	27
Ladismith	16	—	—	—	—	16
Maclear	—	1	—	—	—	1
Mafeking	2	—	—	—	—	2
Malmesbury	7	64	—	—	—	71
Middelburg	1	—	—	—	—	1
Mossel Bay	—	3	17	—	—	20
Mount Currie	2	2	—	—	—	4
Mount Frere	2	—	—	—	—	2
Namaqualand	—	3	—	—	—	3
Oudtshoorn	19	—	—	—	—	19

* Phosphoric acid determinations only.
† Same samples examined by different methods.

Division or District.	Method I., Standard.	Method II., German.	Method III., Maercker's.	Method IV., Hilgard's.	Method V., Dyer's.	Total.
Paarl	51	5	—	—	—	56
Piquetberg	1	1	—	—	—	2
Port St. John's	1	—	—	—	—	1
Prieska	4	—	—	—	—	4
Richmond	2	—	—	—	—	2
Riversdale	—	—	24	—	—	24
Robertson	22†	12	—	4†	4†	34
St. Mark's	4	—	—	—	—	4
Somerset East	2	1	—	—	—	3
Stellenbosch	26†	13	—	—	1†	39
Steynsburg	9	11	—	—	—	20
Stockenstrom	—	5	—	—	—	5
Swellendam	9	29	—	—	—	38
Tulbagh	9	4	—	—	—	13
Uitenhage	10	1	—	—	—	11
Umtata	2	—	—	—	—	2
Umzimkulu	2	1	—	—	—	3
Uniondale	12	—	—	—		12
Victoria East	1	—	—	—		1
Vryburg	16	—	—		—	16
Willowmore	—	1		—		1
Willowvale	4	—	—	—		4
Wodehouse	3	—	—	—	—	3
Worcester	34	—	—	—	—	34
Totals	471	290	44	4	11	805

In the following pages are tabulated the results of each individual chemical analysis; as a matter of convenience, the soils of each division or district of the Colony are dealt with separately. In respect of each area some preliminary remarks are offered regarding the collection of the samples therefrom, and, as previously indicated, it has in all cases been noted whether this sampling had been officially conducted, or through private media. In every case, too, the method of analysis has been specified, and in most instances a few comments are added on the general characteristics of the soils of the district, or of such localities as may seem to call for special observation.

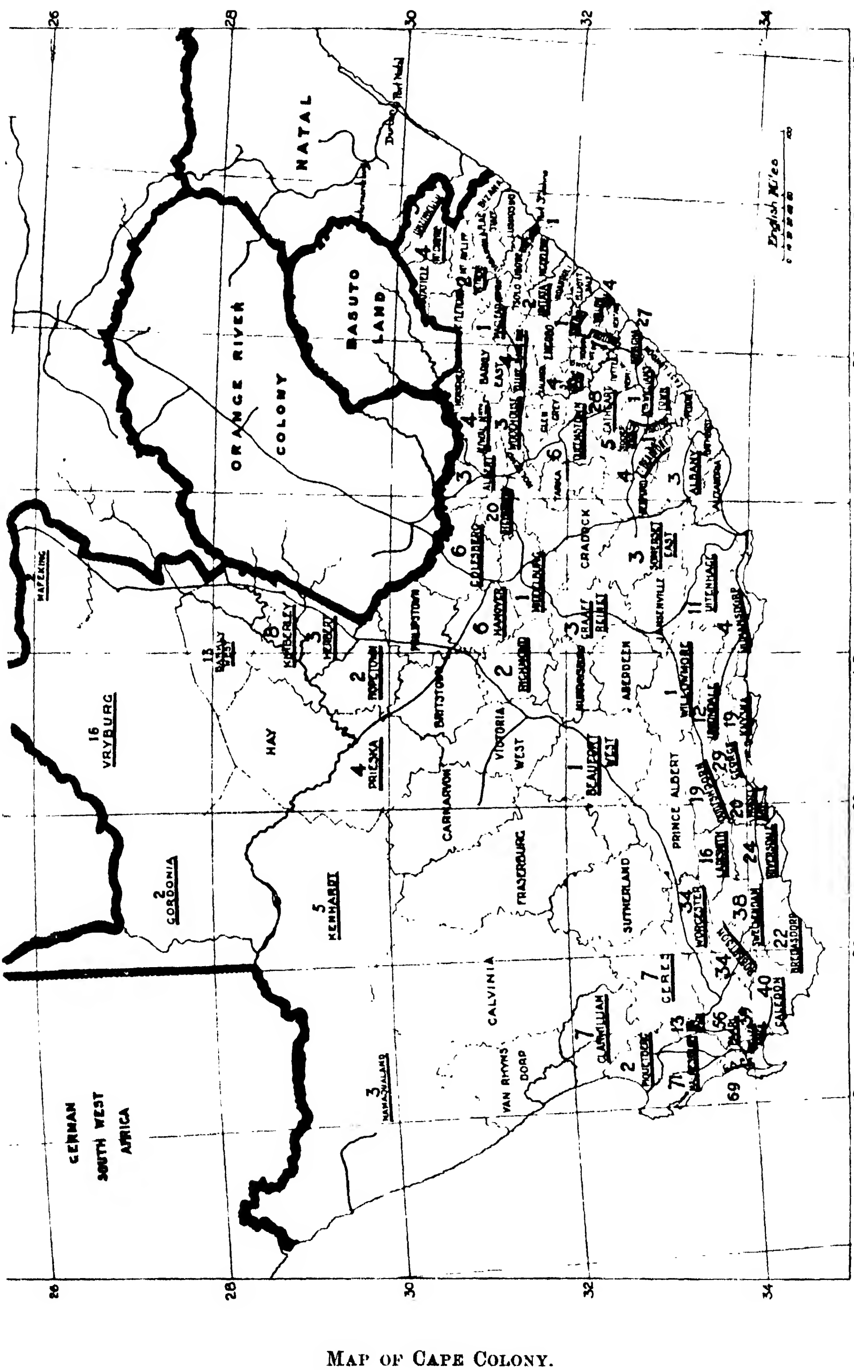
ALBANY.

(Officially collected.)

No.	Field Cornetcy.	Farm or Place.	Collector.
1.	Lower Riebeek.	Langley Park.	A. C. Macdonald.
2.	,,	,,	,,
3.	,,	Highlands.	,,

The three soils examined were collected in the Highlands district. Sheep running on the two farms whence the samples were taken had been found to be greatly benefitted by giving them a regular supply of bone-meal mixed with salt. Lamziekte had been prevalent on the same farms, indicating apparently an insufficient supply of phosphates in the food.

† Same samples examined by different methods.



MAP OF CAPE COLONY.

Showing Divisions (underlined) from which samples of soils were collected for Agricultural Chemical Analysis, and number of samples analysed in each case.

The theory prevailed, due, in part, to the foregoing facts, that the soil of the Zuurveld generally lacked phosphatic material. The lands on the farm Langley Park, whence the first sample was taken, were being employed as grazing ground for some of the sheep above referred to; the second sample, which is distinctly poor in lime, was taken from the same farm, but from a portion on which sheep which were not habitually and specially provided with salt in their food were stocked; such a provision did not appear to be so much needed there as in the former place. The third sample was taken from the veld near Highlands Railway Station. No. 1 contained a fair reserve of phosphates, but both the other soils were lacking in this respect. The analytical results were as follows:

(Method II.)

No.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through 3 mm. Sieve.		
	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	·88	5·62	·0064	—	·12	—	·084
2.	·62	2·53	·0167	—	·065	—	·036
3.	·59	5·97	·0106	—	·11	—	trace.

Determinations of the readily available phosphoric oxide resulted as follows:

(Method V.)

No.	Percentage.
1	·026
2	trace
3	trace

Magnesia and sulphuric oxide were also determined in these soils, with the following results per cent.:—

No.	Magnesia.	Sulphuric oxide.
1	·023	·062
2	·029	·075
3	·024	·052

Research has shown that nitrifying bacteria need phosphates for their development; hence lack of phosphates is apt to go hand in hand with retarded nitrification. This latter process is also stopped by soil acidity, so that the neutralising effect of carbonate of lime not only improves sour soils, in that it removes the cause of their acidity, but it also promotes the production of the soil nitrogen by affording the bacteria facilities for nitrogen-fixation. The supply of nitrogen to the plant is thus dependent upon a sufficiency of lime and phosphates in the soil.

The soils of a great part of the Albany Division, and of the adjacent divisions of Bathurst and Willowmore, are apparently derived from the quartzites of the Zuurberg Range in the Witteberg geological series, a formation lying over the Bokkeveld series, which forms a large portion of the Ladismith Division. Like the soils derived from the somewhat similar Table Mountain series in the George Divison, these sands, or sandy loams, as they become in certain localities, are agriculturally poor, and would be greatly improved by the admixture of clay, especially if vegetable mould were added simultaneously, and the further addition of lime, either as burnt lime, or, less expensively, as crushed limestone would vastly augment the soil's adaptability for agriculture.

ALBERT.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Lower Groot River.	Odendaalstroom.	A. Struben.
2.	,,	,,	,,
3.	,,	,,	,,

These samples were collected by an officer of the Public Works Department from irrigable lands on the bank of the Orange River below Odendaalstroom. No. 1 was a brown silt, rich in lime, but of medium quality as regards nitrogen; No. 2 a stiff red, sandy clay; and No. 3 a red sandy clay. These red soils are apparently derived from the red shales and clays of what have been termed the Burghersdorp beds.* These beds consist of fine-grained sandstones, but their fertility seems to be due to the still finer clays with which they are associated.

The chemical analyses† resulted as follows:—

(Method I.)

No.	Percentage of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide
1.	100	3·46	4·42	·0071	·070	1·372	·042	·149
2.	94·6	2·44	3·71	·0071	·056	·540	·048	·138
3.	95·2	2·10	2·68	·0089	·014	·424	·051	·089

Of these three soils, the silt, as frequently proves to be the case, is chemically the best, and No. 3, the most sandy, is the worst, being poor in nitrogen and potash, with only a moderate amount of phosphates. No. 2 is well supplied with lime, although inferior to No. 1 in this and other respects. All these soils are lacking in potash, but it must be remembered that the good all round supply of lime compensates for other chemical defects.

ALIWAL NORTH.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Aliwal North.	Municipal area.	E. A. Nobbs.
2.	,,	,,	,,
3.	,,	,,	,,
4.	,,	,,	,,

In texture the above soils were all fine grained, and in many respects resembled those from the adjoining Division of Albert. The geological formation here too almost entirely consists of Burghersdorp beds. All the samples were taken from the municipal area; the first from a rich wide level flat flanking the Orange River, the last at a spot lying some distance back from the river. Nos. 2 and 3 were taken along the banks of the tributary Kraai River, the latter at some distance from the water side.

* Ann. Rept., Geological Commission, 1904, pp. 75 and 77.

† For mechanical analyses of these soils see under the head of "Physical Composition of Soils," Part VII.

The results of the analyses are as follows:—

(Method I.)

No.	Percentage of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	99·5	3·23	3·66	·005	·098	·376	·079	·088
2.	99·4	4·07	4·32	·004	·028	·276	·123	·087
3.	98·0	3·61	4·17	·004	·113	·192	·128	·057
4.	97·7	5·08	4·73	·003	·098	·036	·123	·056

It had been anticipated that the first of these four soils would prove to be chemically of good quality, and the analysis confirmed this view, the proportion of lime being satisfactory, although potash and phosphates are present in only moderate amount. Taken all round, these soils possess the chemical and physical requirements of good fertility.

Barkly West.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Hebron.	Brady's.	E. A. Nobbs.
2.	,,	,,	,,
3.	,,	Patrys Kraal.	,,
4.	,,	,,	,,
5.	,,	H.V. 75.	,,
6.	,,	,,	,,
7.	,,	Gaanzepan.	,,
8.	,,	Zwartputs.	,,
9.	,,	,,	,,

These nine samples were collected by Dr. E. A. Nobbs from different farms intended to be irrigated from the Harts River by means of a canal and furrows. The idea was to bring some twenty to thirty thousand acres under irrigation in this way. The specimens were selected with a view to securing types of considerable area below the line of furrow. The first sample, a red loamy alluvial soil, was taken on Brady's farm, at a point, just above high flood level, 2¾ miles above the railway bridge, and 200 yards north of the banks of the Vaal River. The sub-soil is of similar character to that at the surface. The area appeared to be traversed by dolerite dykes, which would probably cause great variation in the depth of the soil, and hinder free drainage. On land adjacent to No. 1 mealies have been grown without manure, at frequent intervals, although not continuously, since 1874. No 2 was a red porous, friable, gravelly loam soil, of somewhat similar type; it was collected on the same farm, about half a mile north of the homestead, and 1¾ miles from the border: this sample is representative of the higher-lying undulating veld in the neighbourhood. The soil depth is about 30 inches, and the sub-stratum consists of water-worn gravel. The only crops grown here are mealies and Kafir corn: these crops are raised continuously for three or four years, after which the land is allowed to lie fallow for a similar period of time. On the lands represented by both samples 1 and 2 the Vaalbosch, *i.e.*, Atriplex, or Salt bush, is to be seen.

No. 4 was taken from rising ground to the south of Patryskraalvlei, and is typical of a light fine-grained brown loam of an average depth of fifteen inches: the subsoil consists largely of dolerite, and boulders frequently show on the surface. No. 3 was also collected on the farm Patryskraal, to the south-east of the proposed reservoir. The sample represents a stiff red clay-loam, very level and undrained, and generally shallow, although varying in depth from place to place, and resting upon a stiff blue clay, which in turn lies upon limestone. Here too the Vaalbosch grows. Further up the slopes towards Grecian Kopje, the clay subsoil disappears, and a red sandy loam surface soil rests directly on the limestone.

The western slopes of the low hills to the east of Patryskraal possess a soil, apparently very much the same all along, rising from the flats where sample No. 3 was collected, and running up to rocky summits. This soil, represented by No. 9, is a very characteristic fine-grained rich-red loamy sand, free from stones, and uniform to a depth of over thirty inches. Due west of the place where that sample was collected, but on the wide flat below the site of the suggested dam walls sample No. 5 was taken. This represents a shallow, fine-grained, red sand, on which Mimosas grow. It rests upon limestone, which every now and again appears on the surface. The sample is typical of a wide stretch of land. No. 6 resembles No. 1 from Salisbury (see Vryburg list), and proves the uniformity of this wide tract of country, which extends from the low ridges lying some 2,000 yards to the east of the railway up to Gaanzepan, and from the boundary of the farms Zwartputs and H.V. 75 to Iddesleigh. These sandy flats appear to continue down to quite near the Harts River: the soil is a very even-grained brown sand, free from stones, and of considerable depth. The red colour is characteristic of weathered surfaces, for, when the ground is turned over with a spade, the brown always shows.

At Zwartputs a limited area of different type is met with, represented by sample No .8. The soil is a deep humus, brown in colour, and sandy at the surface, but it becomes very dense at a depth of about twelve inches.

Sample No. 7 shows a difference in physical character. As distinct from the poor red sand found elsewhere, the soil of the upper portion of the lower levels between Gaanzepan and Putsfontein or Blaauwboschputs, is a brown loam about one foot deep, with a yellow clay-loam subsoil. This type of soil may possibly extend over some five hundred acres, according to Dr. Nobbs, from whose report on the tour the greater part of the above description has been compiled.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
10.	Hebron.	—	J. E. Fitt.
11.	,,	H.V. 67.	—
12.	,,	H.V. 63.	H. C. Litchfield.
13.	Daniel's Kuil.	Koopmansfontein.	J. Spreull.

Nos. 10, 11, and 12 were also collected from the area proposed to be irrigated by the Harts River, Nos. 10 and 12 represent surface soils. No. 10 was collected from Government land in the Harts River valley, and Nos. 11 and 12 from two farms in the Burg Pits valley.

No. 13 was collected on the Government farm Koopmansfontein from flat country abounding in Vaalbush, sour karree, a sort of ganna bush, reeds, and long grass, and formed a fair type of the grazing ground in the vicinity. The ground is of a rocky nature and the soil shallow, with a gravelly subsoil. Fragments of limestone lie strewn about the land, which, in the spot whence the sample was taken, had never been under cultivation.

The following are the results of the chemical analyses* of the soils comprised in the foregoing lists:—

(Method I.)

No.	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1	92·2	·94	1·78	·004	·028	·044	·050	·031
2	84·4	1·16	2·80	·004	·042	·020	·112	·045
3	93·4	3·33	4·19	·003	·098	·240	·123	·031
4	83·4	2·02	2·98	·005	·070	·082	·056	·038
5	97·3	·66	1·47	·003	·028	·020	·046	·013
6	94·6	·63	1·31	·003	·063	·036	·035	·014
7	94·6	4·74	10·90	·004	·134	3·768	·187	·101
8	98·3	2·57	3·03	·003	·084	·084	·141	·023
9	96·8	·79	1·69	·002	·056	·020	·037	·022
10	98·2	1·44	2·87	·0107	·098	·112	·023	·104
11	96·6	6·82	5·64	·0089	·070	1·037	·054	·195
12	97·6	6·03	4·98	·0089	·098	·461	·027	·154
13	91·3	2·51	8·20	·0028	·094	3·338	·125	·066

No. 1, from a chemical point of view, is poor all round: No. 2 is fairly well supplied with potash, but poor in other respects. Of the two Patryskraal soils, No. 4 is below normal in all plant food constituents, but No. 3 has a better supply; both soils, however, are lacking in phosphates. Nos. 5 and 9 are two soils which are chemically very poor. No. 6 has a moderate proportion of nitrogen, but its mineral plant food is deficient. The Zwartputs soil, No. 8, which was recognised by external appearance as a soil of different type from the preceding, also proved to be superior upon analysis; it possesses a fair supply of all plant food, phosphoric oxide excepted. The brown loam No. 7 is altogether the best of the entire series: chemical analysis shows the amounts of nitrogen, potash, and phosphoric oxide to be normal, lime being present in abundance. It does not seem impossible that the doleritic rocks in the vicinity may have contributed greatly to the chemical constituents of this soil.

The farm represented by No. 13 is about sixty thousand acres in extent, and, in view of the fact that the cattle whose grazing ground it constitutes are prone to attacks of "lamziekte," the scantiness of phosphatic material in the soil deserves attention. At the same time one soil sample can scarcely be taken as typical of so extended an area, and if it were, the difficulty presented of remedying a lack of phosphates in so wide a tract is undoubtedly enormous.

Beaufort West.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Nieuwveld.	Roos Plaats.	W. C. Rose.

On the farm Roos Plaats, formerly known as Bronkhorst Vlei, and adjoining Doordrift and Spitskop, in the Nieuwveld district, a sample of soil

* For mechanical analyses of Nos. 10, 11 and 12, see under "Physical Composition of Soils."

was taken from a valley in the neighbourhood of a perennial stream between two ridges. The soil had a light, sandy appearance, but the subsoil was of a clayey nature. Upon analysis the following results were obtained: —

(Method 1.)

No.	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve		
	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	94·0	2·57	5·15	·008	·196	·356	·300	·114

The chemical analysis bears out the opinion of the occupant of the farm, that the soil left nothing to be desired. During its present tenancy, which had lasted ten years, the soil had received no manure of any description, while other lands, lower down the river on the same farm, produced very indifferent crops until manured with guano.

It is probable that this fertility is largely due to the calcareous tufa which forms a characteristic feature of this part of the country, and is evidently the result of the disintegration and decomposition of the dolerite which abounds in the Karroo. As a rule, soils thence derived appear to be well supplied, not only with lime, but also with potash, while even the proportion of phosphoric oxide is fairly high.

(To be continued.)

WOOLLY APHIS AND TOBACCO EXTRACT.

NOTES ON OTHER REMEDIES AND ON LIFE CYCLE.

By CHAS. P. LOUNSBURY, Government Entomologist.

The Woolly Aphis or American Blight (Blatluis or Witluis) is the most troublesome apple tree pest in the Colony, other perhaps than the Codling Moth; and in those districts where it remains abundant during the winter, it can most readily be combated by sprays at this time of year owing to the absence of foliage. Strenuous efforts should be made at this season to clean the trees so that spraying for the pest will be unnecessary during the summer.

Infested water shoots and other worthless growth should be cut off and burned, and every spot of the insect thoroughly drenched with wash. The Aphis is not at all difficult to kill if it is reached: and the lack of satisfaction generally experienced in spraying against it is due to its great prolificacy combined with failure to make the spray fully penetrate the masses clustered on the rough lumpy growths caused by the insect itself, or to reach many colonies secreted under scales of bark or in crevices, particularly where branches have been removed. Resin wash, soap suds, paraffin and water, paraffin emulsion, and tobacco water are all highly efficacious if used at proper strength. Lime-sulphur, and lime-sulphur-salt seem quite useless against it, as are also Bordeaux mixture, Paris green and arsenate of lead. Resin wash and paraffin emulsion should be used at the standard strength given in the "Remedies Sheet" issued by this Department. Soap may be soft or hard, but should be of good quality, and used at one pound to three gallons. Paraffin oil and water needs to be supplied with a special pump such as the Deming "Success" with paraffin attachment; and owing to the liability of the pumps of this type to deliver too much or too little oil and thus lead to the injury of the plant or the escape of the insects, this spray is only qualifiedly endorsed. However, the apple tree is relatively little sensitive to oil and in competent hands the "Success" pump at least is fairly reliable.

Tobacco has long had a high reputation as a Woolly Aphis destroyer, but little use has been made of it in this country owing to the difficulties of getting cheap tobacco here and the extreme variability in the strength of that which is procurable. By the use of a reliable brand of tobacco extract, both these difficulties may be overcome. Fruit growers in some of the Western United States have lately come to appreciate this fact, and during the last two seasons they have used immense quantities in combating the Woolly Aphis and other aphides. Some South African parties, chiefly stock farmers, have been using it systematically against aphides for a number of years. At the strength in which it appears desirable to use it against Woolly Aphis, its cost is approximately the same as normal strength paraffin emulsion and not much more than resin wash;

and whereas these washes require cooking and are rather troublesome to prepare, tobacco extract has only to be thinned with a little water to prepare it for mixing with the full amount for immediate use. Then it seems an agreeable fluid to apply and has no injurious chemical or wearing action on the spraying apparatus; and finally it appears quite non-injurious to the foliage of apple trees. Uniformity in strength is a feature of great importance in tobacco extracts, and some of the rather numerous brands procurable in this Colony are much more reliable than others in this respect. One in which the content of nicotine is high at one time and low at another is less desirable than one which can be depended on to have a low but uniform percentage, because if one dilutes the latter to the same extent every time he can depend on its action. American experience tends to show that the diluted wash should contain about one-half of one per cent. of nicotine.

During the past month Mr. W. A. Larmuth of Orchard Siding made tests with "Leaver's Eagle Brand" extract and the sprayed trees were shortly afterwards inspected by the writer. Most of the trees treated were ones that had been cut off and re-grafted last year and there was therefore not much surface to spray, but they were very heavily infested with the insect on the new growth, about the stubs where the branches had been removed, and in numerous cracks and old wounds through the bark. As the spraying was in the nature of an experiment care was taken to have some trees treated with particular thoroughness. The dilutions tested were 1 part to 75 of water, 1 to 100, 1 to 125, 1 to 150, 1 to 175, 1 to 200, 1 to 225 and 1 to 250: and at least six trees were treated with each. Even the most dilute strength killed the aphis where it was fully exposed; but owing to the escape of a large proportion in the cracks and crevices the work of the dilutions weaker than 1 to 175 was not considered satisfactory by the writer who, as the result of his observations on these tests, thinks the dilution for practice, in the case of this brand, should not be more than 1 to 150 of water. Brands which contain less nicotine should be used proportionately stronger. No living aphis at all, not even at the bottoms of the deepest crevices, was found on the trees thoroughly treated with 1 to 75 and 1 to 100. This was the case whether the crevices extended upwards or downwards; and it is thought that the insects farthest in must have succumbed either to fumes, or to nicotine carried to them by capillary attraction. Only a very few were found alive on the 1 to 125, 1 to 150 and 1 to 175 trees, and in most cases those found were far in under scales of bark. The examination of the trees, purposely treated less carefully, demonstrated sharply the necessity for thoroughness. Even the 1 to 150 strength left many alive in deep cracks, and it was clearly evident that to get satisfactory results the spray must hit with force and be directed into every hole. A few trees were purposely sprayed with 1 to 150 in the way it is customary to spray lime-sulphur-salt wash. These were large and much branched trees that were about as bad with the insect as trees can be. In some places the execution was complete, but in other places, as behind many of the innumerable swellings and down beneath some of the masses of dead ones, there were plenty of survivors to renew the infestation. Such spraying is not good enough for a quick breeding pest like the Woolly Aphis.

The fecundity of the insect was well brought out through studies made by an American entomologist (W. B. Alwood, Virginia), a few years ago: and, as adding emphasis to the injunction that the treatment with any wash must be very thoroughly carried out to get satisfactory results, it is here desirable to refer to them. From a single female which gave birth to her first young on May 5th (spring in America), he reared twelve generations of the insect in the same season, the twelfth beginning to

appear on September 20th or only four-and-a-half months after the first. He found that an individual began to produce young when 8 to 20 days old and continued to reproduce for one or two weeks. Two to 20 young were produced each day and on one occasion 24 were counted; and the highest total observed from one individual was 123. True males and females were not observed until very late in the season, and the individuals in the twelve generations traced from one specimen were all agamic females: they produced their young alive without mating. In the longer warm season of the coastal parts of Cape Colony, it is not improbable that there is an even greater number of generations. Young were being born freely on unsprayed trees at Orchard Siding (Hex River Valley), on July 11th of this year, and it is not at all uncommon, in south-western districts, for the pest to be more abundant in midwinter than in midsummer. But considering there to be only twelve generations in the season and estimating the increase each time as a hundred fold (which would be well within the possible number quoted above), the twelfth generation from a single agamic individual would amount to a million million million millions. Allowing each individual a sixteenth of an inch square, this would suffice for a layer five deep over the entire land and water surface of the earth. We know the utter absurdity of imagining that a millionth part of such a prodigious increase would occur, but the computation assists one to realize how it is that a tree can so quickly become badly reinfested with the pest after the application of an efficient insecticide in any but the most careful manner. One might doubt that satisfaction was to be gained by the most painstaking treatment were it not that abundant experience has proved the fact.

Winged specimens of the aphis are produced in March and although they seem disinclined to fly they probably assist in spreading the infestation. They are said to produce true males and females, and the true females after mating are said to lay eggs. The individual lays one egg only but this is nearly as large as herself. The egg gives rise to the ordinary non-mating female or stem-mother. Eggs have not been observed in South Africa but probably occur. Some entomologists say that it is unwise to spray when there are winged specimens on the trees on the assumption that it causes some to take flight and thus might lead to new centres of infestation, but the writer believes that it is highly desirable to combat the pest at that time, if action has been neglected earlier, in order to destroy the winged individuals and thus prevent voluntary flight.

If trees get badly infested with Woolly Aphis during the summer they should be sprayed as advised for the winter. But if the pest is got under fair control, summer or winter, strenuous efforts should be made to prevent the necessity for further spraying by destroying the colonies as far as they appear. A close watch should be kept on typical trees and as soon as spots are discovered, a tree to tree inspection should be made and every spot well daubed with a sure-kill wash applied with a brush. As there is little risk of injuring the tree, and little additional expense, much stronger washes than one would use as a spray are advisable; and well made double strength paraffin emulsion, double strength resin wash, soap suds 12 ounces to a gallon, (warm to have it fluid) tobacco decoction, one pound to the gallon, and any reliable tobacco extract 1 part in 25 to 50, are all recommended. The State Entomologist of Colorado, whose office has much practical experience in combating Woolly Aphis and Codling Moth, recently suggested the summer spraying of apple trees with arsenate of lead diluted with tobacco extract instead of plain water, the arsenate of lead to kill Codling Moth and the tobacco ingredients to kill Woolly Aphis. But to spray a tree properly for both insects would

WOOLLY APHIS on Water Shoot of Apple.

take much more wash than for Codling Moth alone, and the writer believes that in this country it would pay better to keep the Woolly Aphis subjected by frequent hand treatments. Labour is so cheap here that we can well afford to employ time-taking remedies that are too expensive for use in Australia or America, and while it may take much time to find and destroy a few scattered patches of the aphis, the old saying "a stitch in time saves nine" applies to the case. The neglect of a few patches may be punished through the formation of many of the characteristic distorted growths which will ever after afford the insect good lodgment or else cause the loss of the affected twigs and branches.

The root infesting form of the pest is just as easily killed individually as the above-ground form, but the difficulty of reaching it is vastly greater. The treatment of roots more than three or four feet from the trunk is not often attempted owing to the trouble and expense and because the chief injury is considered to be to the base of the tree and the nearby roots, which if much infested are likely to decay. To economise the material, it is customary to remove the surface soil and thus expose the origin of the main lateral roots. A circle of earth about six feet across and three to six inches deep is generally cleared. Care should be exercised to avoid wounding the large roots. One treatment now commonly recommended in America is to remove the surface soil for one or three feet out from the trunk and then to sprinkle finely powdered tobacco uniformly over the bottom of this hole. The quantity is varied with the size of the tree but roughly it is about half a pound for each year of the tree's orchard life with a maximum of about six pounds. One treatment a year is said to be sufficient. This treatment, however, is said not to be uniformly successful in America and sometimes to be an utter failure, and this has been the experience of some South African parties who have tested it. The variability in action is probably due to some tobacco being rich in nicotine and some poor, and perhaps also to differences in the nature of the soil and the amount of moisture. Where powdered tobacco is cheap the measure is well worth trying.

Tobacco extract at the strength successful for spraying the tops was recently reported by a prominent American entomologist as much more successful than tobacco dust for the root aphis when used in the same manner. One and a half to four gallons was either poured or sprayed over the exposed roots in his experiments, and after most of the liquid had settled away the soil was replaced. Mr. Larmuth drenched the roots of a number of the trees upon which he experimented, using four gallons of 1 to 150 on some and the same quantity of 1 to 200 on the rest; but when the writer examined these trees four days after the treatment he found some living aphis on the roots of every one within the zone drenched. It seems posible, however, that the wash had not had its full action. Numerous dead aphides were found.

Paraffin emulsion has long been recommended for the treatment of the roots, and is probably as efficient as any other fluid for the purpose. It is generally used at the normal strength, one part of emulsion to nine parts of water, when it contains about seven per centum of oil. The State Entomologist of Georgia, as the result of experimental experience in treating orchard and nursery trees a couple of years ago, however, recommended that one and a half to double this strength be used. He says that the soil should be fairly dry before the emulsion is applied and then enough should be used to saturate the soil thoroughly to a depth of three or four inches. About five gallons, according to him, is required for a hole five feet across. He found that the odour of paraffin remained for

three or four months and sufficed during this time to prevent re-infestation. One treatment a year he considered ample to keep the roots practically clean within the area drenched. He recommends that this treatment be applied while the tree is actively growing in the spring or early summer lest damage results to the plant. Apple trees do not appear to suffer at any time of the year from the application of well-made emulsion of the strength recommended but it is best to keep on the safe side.

These notes would not be complete without reference to "blight-proof" stocks. Nearly every farmer who has had to deal with Woolly Aphis has recognised that some varieties suffer with the pest far more than others. Some varieties are positively free from attack, and advantage is now extensively taken of this fact by nurserymen to produce trees on roots which will keep clean. The more important Cape nurserymen now use "blight-proof" stocks exclusively for apples, and the plant import regulations of the northern colonies prohibit the introduction of apple trees unless grown on such stocks. The credit of circumventing injury to the roots in the manner indicated belongs to Australia where the practice seems universal. It is about fifteen years since the usage began at the Cape, and the party who now plants an apple tree with roots susceptible to the pests acts most unwisely. The "Northern Spy" stock is most generally used and, with a few exceptions of little importance, all varieties do well on it although not always growing quite as freely as if on ordinary seedling stocks. The blight-proof stocks are propagated by layering or by root-grafting. It is almost needless to say that the stock does not impart freedom from the pest to susceptible kinds grafted on to it; and as in the case of vines care must be taken to remove any roots which start from above the graft, as they likewise may become infested.

Some varieties of pear are subject to a slight infestation of Woolly Aphis. The Winter Nelis suffers most commonly, and occasionally develops abundant swellings in consequence of the attack. The Easter Buerre and Louis Bonne are also said to get infested, and it is not uncommon to find small numbers of the insect on the roots of pear seedlings imported from France.

THE DESTRUCTION OF MOUNTAIN VEGETATION.

ITS EFFECTS UPON THE AGRICULTURAL CONDITIONS IN THE VALLEYS.

By F. E. Kanthack, A.M.Inst.C.E., Director of Irrigation, Cape Colony.

A Paper read before the South African Association for the Advancement of Science, Grahamstown Meeting, July, 1908.

In all parts of the world civilised countries are now coming to appreciate the urgent and immediate necessity for preventing further destruction of forest growth and for re-afforesting destroyed areas. This is especially noticeable in the great irrigating countries. America, India, and others, such as France, etc., where the effect of ruthless destruction of forest growth is becoming more obvious every year, and the sufferers are realising the true causes. Man is everywhere the origin of the trouble. In his utterly selfish and unreasonable claim to absolute individual freedom to do as he wills with the resources of Nature he has by burning, felling, lopping, barking, over-grazing, or other maltreatment of the forests himself denuded the hillsides of their growth and their soil. He has caused the once perennial springs to dry up and has partly buried good fertile soil in the plains below beneath masses of useless sand and gravel. He has caused unthinkable quantities of rich alluvium to be carried away to the sea and has originated the disastrous floods which now cause such terrible loss of life and property.

In India, along the foot hills of the Himalayas I have seen hundreds of square miles of what was considered amongst the best agricultural land in the Punjaub in danger of becoming a desert owing to its being slowly covered with detritus washed from the denuded hillsides. The denudation was caused by over-grazing. Fortunately for India, drastic legislation was possible without encroaching appreciably on vested rights, and the prohibition of grazing on these foot hills for a period of twenty years is rapidly restoring the old protective covering on these hill slopes.

In France, in the case of the Gironde River, violent floods cause deposits of silt which covers up good land and, preventing the navigation of the river, causes an annual loss of £200,000. Vast sums spent on Bordeaux have had no effective result, and this port is now useless for large vessels. It is estimated that 225 million cubic feet of silt are annually poured out to sea by this river. All this has been directly and conclusively traced to unrestrained rush of flood water from the mountains, due to

the denudation of their slopes. This state of things results entirely from the action of men, owing to forest fires, excessive grazing, removal of leaves and litter, and other ill-treatment, which benefits the individual at the expense of the community. The Rivers Loire and Rhone have a similar tale to tell. Recent reports of debates in the Franch Chamber have revealed a most serious state of things in different parts of that country; and the unanimity with which all authorities concerned fully appreciate the necessity of a very vigorous forest policy as a means of protection is most praiseworthy, when compared with the narrow, selfish, and sordid obstruction to forest protection experienced in some other countries.

In America the need of staying the terrible destruction of forest growth, in the interests of agriculture, irrigation, and climate, seems to have been realised with startling suddenness, and the efforts to stay the progress of destruction are remarkable for their boldness and the immensity of their scope.

In 1891 the President was empowered to create forest reserves, but it has remained fo President Roosevelt to put the forest administration upon an adequate footing. Two years ago he summoned to Washington a Convention of lumbermen and others interested in the exploitation of forests; he explained his policy, and succeeded in awakening the more enlightened amongst them to the importance of a problem which involves much besides the actual conservation of the forests, for it is intimately connected with the vast work of reclamation, irrigation, and improvement of waterways upon which hangs the future prosperity of the United States. The President reorganised the forest service, and pursued his policy with such energy that since 1905 the reserves have increased from 100 to 150 million acres, while the effectiveness of the forest administration is proved by the fact that in 1906 only one-tenth of the area was destroyed by fire, which is a great improvement compared with former years.

In the United States of America forest fires are credited with the annual destruction of property to the value of about 2½ million pounds, and the forests which escape are devoured by the wood pulp industry. The ravages of this industry are forcing other States, such as Canada and Norway, to intervene and create State reserves. In India, though the question of the destruction of forests on the catchments of the great water courses was under inquiry by the East India Company in 1847, a general forest policy was not formulated by the Government of India till 1894, and it is really only within the past few years that the relation of forests to the water supply in the great irrigating rivers has come under serious consideration.

Writing of the destruction of forest growth in the Himalayas, Mr. S. Eardley-Wilmot, Inspector-General of Indian Forests, after describing the forest growth from the snow line downwards, says: "Such a protective belt gives security to the people of the hills, and assures prosperity to those in the plains, and Nature, if left to herself, is powerful enough to maintain the protection she has afforded. Man, however, will have none of it; commencing from the top, he lops the birch forest for his goats or kills it for its bark; the coniferous forest he destroys by fire or prevents its re-juvenation by excessive grazing, while at the lower elevations, by irregulated fellings, by lopping, by grazing and burning, he speedily denudes the hills, and lays them open to the disintegrating effects of wind, sun, and water, and in such circumstances it is not surprising that sudden and disastrous floods should work such havoc in the lower reaches of the rivers."

In parts of Australia the forests are being ruthlessly exploited, and only recently reports were to hand of disastrous floods, which is a sure indication of excessive destruction of the protective vegetation.

France and Germany have for years taken the lead in scientific and practical forestry, and have served as the training schools for the developing of forest services of many new countries. In these two countries also the people have long since been educated to understand the beneficial influence of forests and the need for protecting them.

When State forest services are started in new countries, the scope of their work is generally limited, both in the official and public mind, to the profitable working and conserving of forests and the establishment of new forests for purposes of profit. The enlightenment of the forest officers is naturally in advance of that of the public, who looks upon the Forest Department as an unsatiable ogre, which is ever seeking to grab more and more land, much of which is unsuitable for profitable tree growing. This is just where public opinion is in error. Coming to local conditions, the scope of a South African Forest Department must be greater than that of a purely semi-commercial department, whose sole object is to grow, conserve, and sell forest produce. We must learn to clothe the word "Forest" with a far wider meaning than is customary. It should stand for the veld generally and the mountain or forest-clad veld in particular. Its chief aim should be the restoration and conservation of the natural growth of vegetation on the mountain slopes or other places liable to erosion and denudation. Briefly, the Department should have control of the land wherever the physical conditions are such that the removal of the protection afforded by vegetation must result after a longer or shorter period in the destruction or deterioration of agricultural conditions.

This aspect of the case is fully realised by the Forest Department of this Colony, and it is doing its best to demarcate the watersheds and protect the vegetation on those catchment areas from destruction by fire and excessive grazing. The Department should have every encouragement to continue its efforts in this direction.

In certain portions of the Cape Colony, more especially in what the geologists term the folded belt, which forms the coastal ranges of the Colony, the almost total destruction of all mountain vegetation by fire and other maltreatment is threatening the agricultural prosperity of some of the most favoured tracts in the country with ruin.

Before particularising I will briefly enumerate the beneficial effects of forest growth and vegetation generally in so far as it affects the climate, conservation of the water supply, and protection against denudation.

The effect of forests has been studied in relation to climate and to the drainage issuing both from forest-clad and from uncovered catchments. The climatic effect is dependent upon a number of influences. Firstly, there is the influence upon the temperature of the air. It is only since 1866 that the relation of forests to meteorological conditions has been scientifically investigated in France, Germany, Austria, and Switzerland.

It has been established that the yearly, monthly, and daily mean temperature is less inside than outside a forest—in the summer the difference between the daily mean being as much as 5° C. The general result arrived at by these observations is that forest climate is more equable, though slightly closer than the open.

Meteorological statistics have shown that in well afforested regions there exists a decidedly lower temperature than in others similarly situated, but denuded of tree vegetation.

Secondly, there is the influence on soil temperature. This is a matter of importance, as a high temperature denoted more rapid *evaporation.*

In Europe it has been proved that a forest soil is warmer by about 1° C. in winter and cooler by 3° to 5° in summer.

Thirdly, there is the influence on humidity of the air. Relative humidity of the air is higher in a forest than in the open, as, owing to the temperature being lower in the open, it is with the same *absolute* humidity nearer its saturation point. The difference in favour of forest air expressed as the mean percentage of saturation, varies between 9 and 12 per cent., and is highest in summer.

Depending upon these three influences, we arrive at

The Influence on Rainfall.

In connection with the cause of rainfall there is one simple principle which is universally accepted, viz., that, in order to produce rain, the temperature of the air must be suddenly cooled below the dew point. The most effective cause of this is the expansion of the air on ascending, and this upward movement is caused largely by cyclonic storms.

The effect of forests in increasing the rainfall has been under investigation in Europe for many years, but so far it is only at Nancy in France where statistics have yielded a proof of this assertion. As it has been shown that air in large forests is, especially in summer, cooler than air outside the forest, it is for reasons already stated natural to think that the rainfall over the forest area would be in excess of that outside. At Nancy regular observations taken over a period of thirty-three years show that, without exception, more rain has fallen inside than outside the forest. Thus, taking the rainfall at the centre of the forest at 100, then 93·9 represents the fall at the edge and 76·7 the rain outside the forest.

This state of things has been observed in other European countries, but to a less degree than at Nancy. The proportions given above are independent of wind direction and of the seasons, but are generally more marked in wet than in dry years.

Professor Henry at the International Congress of Silviculture at Paris said: "Wooded hills attract the rain; there it is that atmospheric precipitations attain their maximum, and there also are situated the most important reservoirs and almost all the valuable springs. The mountain forests, particularly those at right angles to moist winds, induce the precipitation of most of the moisture these contain, while denuded slopes have very little influence in this respect. For example, take the hills which border the Adriatic and part of the Mediterranean, which are noted for their aridity. Denuded of forests, these hills are incapable of cooling the air, and therefore compelling the deposition of moisture it contains."

In 1885-6, Mr. Blanford, of the Indian Meteorological Department, showed in his annual report that in the Central Provinces the prevention of shifting cultivation followed by fire had in ten years increased the rainfall over the affected area by 6·86 inches as recorded at fourteen stations. In 1887 he wrote as follows:—

"The general conclusion to be drawn from the investigations is that, while no instance cited fulfils the requirements of scientific proof, the tendency of the evidence they afford is uniformly favourable to the idea that the presence of forest increases rainfall, as by checking and obstructing the movement of the wind, they prevent the evaporated vapour being carried away, and tend to produce that calm state of the atmosphere which is favourable to ascending currents and local precipitation."

In 1897 Dr. Volcker wrote as follows:—

"It is a much debated point whether forests and plantations do actually bring about an increase of rainfall or not. Their real influence and value, however, consist in their lowering the temperature, and thus causing moisture to be deposited which would otherwise pass on. As a consequence of this, forests and plantations will cause rain to fall in gentle

showers, instead of in heavy and often destructive deluges. Thus, a given quantity of rain will be distributed over a greater number of days, and its value to the agriculturist thereby largely increased. The true test of the value of afforestation in this connection is not so much whether the total rainfall will be increased, but whether the number of rainy days will be more."

In Madras, where the effect of forest destruction on the water supply in the rivers has been under observation for over sixty years, there are numerous examples where at present there is a very great shortage of water for irrigation, as compared with the middle of last century, before the forests had been destroyed.

This is as far as we can go to connect forests with climatic conditions, and what has been said above applies really to true forests, by which term is understood a growth of trees sufficiently dense to form a fairly unbroken canopy of tops. But what applies to a true forest applies in a lesser degree to a dense growth of shrub or bush such as would grow on the mountains of the folded belt in this country.

Conservation of Water Supply.

Rain which falls on the ground escapes in four different ways, viz., through evaporation, transpiration, surface run-off, and seepage run-off.

Evaporation.—By evaporation is meant the moisture which passes into the atmosphere in the form of vapour from the water and soil surfaces and from objects resting on such surfaces, including vegetation.

Under the best conditions a large portion of the annual rainfall is returned to the atmosphere through evaporation, and experiments at Rothamsted have shown that in humid regions bearing the same types of vegetation the amount does not vary much from year to year, no matter what the fluctuations of rainfall are. This is not true,. however, for arid and semi-arid regions, because during years of scanty rainfall the upper layers of the soil are for long periods so dry that there is little moisture to evaporate, while, on the other hand, during years of heavy rainfall the air is not sufficiently moist to check evaporation.

The crowns of forest trees hold back comparatively little of the total rainfall. At Nancy, in France, it was found that a deciduous forest held back from the ground less than 8 per cent. of the total rainfall. Whatever amount is held back by vegetation is quickly returned to the atmosphere. In the rank vegetation of our southern districts the percentage evaporated from the surface of the leaves, etc., would probably be less than from a true forest, as the surface exposed is smaller, and is also better protected from the wind.

Experiments made in Germany and France, extending over long periods of time, show that the evaporation from a free surface of water inside a forest is only 40 per cent. of what it is in the open. Dr. Ebermeyer's experiments, extending over five years, showed that the evaporation from forest soil, without leaf mould, was only 0·47 per cent. of that from soil in the open, and with a full covering of leaf mould the evaporation in the forest was only 0·22 per cent. of that in the open.

Enough has been said to show that in a forest only a small percentage of the rainfall is kept from the ground, and that of the major portion which reaches the ground the amount lost by evaporation is but a very small fraction of what would be lost in the open. What has been proved for a big forest is true to a large extent for the thick bush growth common to the protected areas of the coastal mountain ranges of this country.

Transpiration.—Transpiration is that part of the rainfall which sinks into the soil, and is then taken up by the root systems of the plants after the water has taken into solution some of the plant food constituents of the soil. A small percentage of this water becomes, through chemical changes, incorporated into the plant, but the far greater portion is returned to the atmosphere through transpiration. The amount of moisture thus taken from the soil and dissipated, varies very much with different species of plants. No reliable data appear to exist as to the actual amount thus transpired by different forms of vegetation, but there is no doubt that in a country like this, with long periods of dry weather, a dense covering of vegetation causes the loss of a large percentage of the water stored in the upper layers of the forest soil, and transpiration must therefore be considered a dissipating agent of water supply.

Surface Run-off.—The amount of surface run-off depends largely upon the intensity of the rainfall. A steady, quiet rain, will, even on steep and bare slopes, be all taken up by the soil, whereas a very heavy shower will cause a run-off even from a thickly covered gentle slope. All growth of forest, shrub, and even grass provides a covering over the mineral soil of a thick layer of root fibres, dead leaves, and other litter, which effectively prevents soil transportation both by wind and water.

The extent to which rain is absorbed by the ground depends largely upon the physical properties of the soil, the covering of litter on its surface, and on the vegetation. The greater the amount of leaf mould and other litter, the more rapidly is the rain absorbed. The degree of looseness of the mineral soil likewise influences the rate of absorption. In a forest or bush the mulch of leaves and litter keeps the mineral soil loose and in the best condition for rapid absorption.

The conditions which influence the flow of streams are complicated, and it is very difficult to demonstrate by means of actual observation the effect of forest growth on the run-off, compared with what takes place from denuded catchments, all other conditions being identical.

The most complete observations which I know of are those made on several small catchment areas in the San Bernardino Mountains in Southern California, where it has been proved that the effect of the true forest in decreasing the surface flow on small catchment basins is enormous.

The following three tables, which compare three well-forested areas with a non-forested one, show this very clearly.

Rainfall and Run off during December, 1899.

Area of Catchment basin (Sq. Miles).	Conditions as to cover.	Rainfall (inches).	Run-off per Sq. Mile (Acre feet).	Run-off in percentage of rainfall (Acre feet).
0·70	Forested	19	36	3
1·05	"	19	73	6
1·47	"	19	70	6
0·53	Non forested	13	312	40
Rainfall and Runoff during January, February, March, 1900.				
0·70	Forested	24	452	35
1·05	"	24	428	33
1·47	"	24	557	43
0·53	Non forested	16	828	95

Decrease in Run-off during April, May, and June after close of rainy season.

Area of Catchment Basin (Square Miles).	Conditions as to cover.	Rainfall (inches).	Run-off per Square Mile.		
			April.	May.	June.
0·70	Forested	1·6	153	66	25
1·05	"	1·6	146	70	30
1·47	"	1·6	166	74	30
0·53	Non forested	1·0	36	2	0

These tables very clearly show the importance of forests in sustaining the flow of mountain streams.

The three forested catchment areas which, during December, experienced a run-off of but 5 per cent. of the heavy rainfall for that month, and which during the first three months of the following year had a run-off, approximately, of 37 per cent. of the total rainfall, experienced a well-sustained flow for the three months—April, May, and June—which were practically rainless. On the other hand, the non-forested catchment area which during December experienced a run-off of 40 per cent. of the rainfall, and which during the three following months had a run-off of 95 per cent. of the precipitation, experienced during April a run-off of less than one-third of that from the timbered areas, and during May and June the flow from the unforested area ceased altogether.

The same experiments show that of the annual rainfall the run-off from the forested areas amounts to about 33 per cent., whereas 69 per cent. runs off from the non-forested areas.

For most of this information, as regards rainfall and run-off, I am indebted to a paper in the Year Book of 1903 of the United States Department of Agriculture.

On non-forested areas the surface run-off is very great, and the seepage run-off insignificant, on forested areas the conditions being reversed.

In Europe it has been stated that the flow of surface water is completely arrested on forest slopes if these are clothed with healthy growth, so long as the leaf canopy is maintained.

What has been said above for true forests must apply to a very great extent to any thick covering of vegetation.

To sum up, it has been shown that forest growth undoubtedly tends to increase the rainfall over a given area. Of the rain which falls on an afforested area, a comparatively small amount escapes to the streams as direct surface run-off. The obstructions caused by the vegetation and by the thick layer of litter holds up the moisture falling on to it sufficiently long to enable it to soak, not only into the covering organic matter, but also into the mineral soil below, and into the fissures of the underlying rock. Of the moisture which thus soaks into the soil, perhaps one half is evaporated from the surface of the ground, or is taken up into the plants and lost by transpiration. The remainder is discharged into the streams by seepage as a perennial flow, the catchment serving as a natural reservoir. When catchments are denuded, heavy rains cause a very great surface run-off, and cause disastrous and erosive floods in the torrents draining the area. Light rain or scattered showers are sometimes absorbed by the dried up surface of the thin soil covering, and this moisture is rapidly returned to the atmosphere by evaporation.

As regards torrents, the following four propositions are now accepted throughout Europe:

(*a*) That the presence of forest growth hinders the formation of torrents.

(*b*) That the removal of forest growth facilitates the formation of torrents.

(*c*) That the extension of forests causes the extinction of existing torrents.

(*d*) That the removal of forests redoubles the violence of existing torrents.

Coming now to the practical application of the principles enunciated. In the folded belt we have a series of high mountain ranges running parallel with the West and South Coasts. These ranges consist chiefly of the sandstones and quartzites belonging to the Table Mountain series. The wastage of this formation is about the poorest in this Colony for the purpose of soil manufacture, being exceedingly barren in available plant food. It is coarse and heavy, and apt to form sand dunes, which in many places have thrown large areas of good land out of cultivation.

Though this soil is poor from an agricultural point of view, it is yet capable of sustaining a very heavy veld and forest growth wherever the rainfall is moderate or heavy. In spite of fires, the veld growth on these mountains is often rank and dense, and the facility with which certain species of trees can be grown is remarkable. In this area are found also the largest remaining true forests in the Colony.

A striking geological feature of the folded belt area is that the alluvium of the wide fertile valleys of the main river systems is mainly derived from other sources than the flanking mountains and rich in plant food, and are in parts also being covered with richer and comparatively recent geological deposits such as those of the Cretacious system. Taking the chief river systems of the South Coast between Cape Town and East London, we have, first, the Breede River. This river rises amongst the mountains of the Table Mountain series, but between Worcester and Swellendam, the valley bottom consists of Karroo soils which have been faulted down Uitenhage beds, Malmesbury beds, and Bokkeveld beds, which latter are the richest of the Cape series. In this length the rainfall is small, and the veld sweet. The main tributary of the Breede River is the Zonder Einde River, and its valley is a typical sour veld, Table Mountain sandstone valley.

Next, further east we have the great Gouritz River system, with its main tributaries—the Touws, the Buffels, Dwijka, Gamka, Oliphants, and Kamnassie Rivers. The first and last of these arise amongst mountains of the Bokkeveld series, the silt of which is very fair. The remainder are all Karroo rivers, which cut through the Great Zwartberg range by way of a number of magnificent gorges or poorts, such as the Buffels River, Gamka, Meirings, and Tover Waters Poorts. It is in the valleys below these poorts that some of the most valuable agricultural areas in the country are to be found in the fiscal divisions of Oudtshoorn, Ladismith, Uniondale, George, and Mossel Bay. The bottom of the vale of Oudtshoorn consists furthermore of the sandstones and conglomerates of the Uitenhage beds, the soil derived from which is rich in plant food. The rich alluvium is thus a mixture of the products of denudation of the Karroo, Uitenhage, and Table Mountain series.

Next, we have the Gamtoos River system, which consists firstly and chiefly of the Groote River and its tributaries, all, in the main, Karroo rivers with an enormous catchment area in this formation; and secondly of the Kougha River, which is mainly a Bokkeveld River. The lower reaches of the river likewise passes through very rich alluvium, much

of which still awaits developments. Near its mouth the soil is further enriched by the presence of a small area of Uitenhage beds.

Further East again comes the great Sunday's River valley, which is essentially a Karroo River, and the extreme fertility of its alluvium below Sunday's River Poort, near Kareiga Station, and in the Table Mountain series, is entirely due to its Karroo origin and to the local presence of Uitenhage beds.

These Uitenhage beds, where they occur in the valleys of the Breede, Oliphants, Gamtoos, and Sunday's Rivers, do not form the sides of the main valleys, but merely subsidiary mounds or ranges of low hills within the valley.

The great rivers east of the Sunday's River are entirely within the Karroo formation to their estuaries, and lie outside the limits of the folded belt.

The river systems described are very old, and have in past ages carried unthinkable quantities of rich Karroo soil away to the sea. At the present time, though the Karroo area drained is much greater than that of the mountainous area of the folded belt, yet the latter now provides the greater portion of the flood water going to the sea, as both rainfall and percentage of run-off are very much greater in this area. The steep mountain slopes of the Zwartberg on the North, and the Lange Bergen, Outeniquas and Zitzikama Mountains on the South are drained mainly by a great number of short torrents, the floods of which have increased in violence and capacity as the steep rugged mountains have become deprived of their original dense covering of vegetation. Instead of these streams providing an abundant supply of perennial water which might be utilised for irrigating the rich Karroo alluvium of the main valleys, they now come down in sudden and violent floods which are too strong and of too short duration to be utilised for irrigation excepting to a small degree, most of the flood water flowing away to the sea. The raging volume of water, heavily laden in its upper reaches with coarse and unprofitable sand from the Table Mountain sandstones, on reaching the comparatively level valley deposits its useless burden on the land it inundates, and at the same time tears away vast quantities of the much finer rich alluvium of the Karroo, Uitenhage series, and Bokkeveld, and carries it off to the sea and helps to swell the dimensions of the great Agulhas Bank.

During the past summer the Oudtshoorn irrigation furrows have been dry, and the lucerne fields have been parched for want of water, and farmers have been buying mealies with which to feed their ostriches. When rain finally fell in the autumn, and dirty torrents came down from the mountains, none came from the Karroo, one wonders what percentage of the flood was saved from the sea, how much useless silt was deposited on the lands, and how much good alluvium was carried away. Nowadays, whenever really heavy rain falls in the mountain area, we hear of great damage to property, bridges swept away, lands either washed away or great sluits formed through them; or they are rendered useless by being covered with sand and boulders. Let anyone roam about these rich valleys, and he will see everywhere the signs of recent devastation by floods. Big sluits, boulder, and sand-strewn flats of once rich arable land, the remains of a great road bridge, etc., and, if he wanders along the banks of the now dry and stony river, he will see its banks everywhere caving in and exposing a great depth of rich alluvial soil. The river is ever increasing in width, and in place of the rich alluvium there is a vast deposit of boulders and sand. As these boulders are deposited further and further down the river, its bed gradually rises, and floods thus slowly rise above the level of the country, denuding it and opening up fresh channels.

In the Oudtshoorn district, irrigation has been practised for many years, but the system now followed is typical of the extreme individualism which is such a marked characteristic of the South African Colonist, and is inimical to the full irrigation development of the district as a whole. Where there should be one irrigation furrow with well built head works, there are now half-a-dozen or more. Each has a head sluice and weir of rough and cheap design; a head reach necessarily in deep cutting, or else built up roughly along the edge of the river, extremely liable to severe damage every time the river is in flood, causing heavy erosion of its banks. With only a moderate amount of co-operation amongst the irrigating farmers, well designed and properly built head works and furrows could be made which would not only resist the destructive action of floods, and prevent the erosion of valuable soil, but would very materially increase the irrigable area under one big furrow, as compared with the area commanded by a number of short ones. This is, however, a secondary consideration in the present investigation.

An examination of the conditions in these valleys can only lead one forcibly to the following conclusions: —

Firstly.—The deep and rich alluvium is being slowly yet surely carried away and replaced by, or covered up by, useless sand and boulders.

Secondly.—The rainfall on the adjoining mountains has become insufficient for the needs of irrigation, as it runs off the steep and bare slopes in destructive torrents almost as fast as it falls. Hence only a small percentage of the flood water is used for irrigation purposes, the greater portion flowing away to the sea. This progress to ruin once started continues at a rapidly increasing rate until the now fertile valleys will be converted into wildernesses.

How different things might be and ought to be were man a little less thoughtless and callous of his own and his children's interests. What has brought about this progress to ruin. Travel where you will in the Zwartbergen or other coastal ranges during the dry summer months, and to all points of the compass you will see almost to the summits the mountain veld ablaze. Year after year this has gone on. Rain follows the fire and washes away the unprotected loose sandy soil until now these mountains appear to be devoid of soil altogether. Veld burning, ruthless destruction of trees, and over-stocking are the three main causes of the trouble in the valleys below, and what has been said in the first portion of this paper fully justifies this conclusion. When we think of the trifling and often purely transitory advantage derived by a few individuals from the burning of hundreds of square miles of mountain veld, and the inconceivable damage which is being done to the closely inhabited lowlands, the mental condition of a community which allows such a state of things would be difficult to appreciate, were it not for the fact that this indifference is due to universal ignorance. If the people of this Colony are sinning in this respect, they are certainly sinning in good company, as, with the exception of France and Germany, the awakening of civilised peoples to the importance of the protection of forest growth as a natural necessity is of very recent date. But what can be done to keep off the evil? We cannot grow forests all over the steep and bare slopes of the great coastal mountain ranges. That is quite true, and it is also unnecessary to do so. Such a course would be impossible for physical and financial reasons. Let us have forests established on the mountains wherever possible, but what we need immediately is a purely passive forest policy of enclosing and protection. Prevent fires, grazing and cutting, and in a few years much good will ensue. The crumpled, contorted, and fissured strata of the folded belt are particularly adapted

for the storage of water. Given a moderately dense covering of vegetation, almost every stream issuing from these mountains should have a strong clear perennial supply; the flood run-off should be a much smaller percentage of the precipitation, and should be extended over a much greater time than is at present the case. Great damage has been done to the valleys, and, even if we start at once on a vigorous campaign, there is so much leeway to make up that we must not expect the recovery to be very rapid. In these matters prevention is comparatively simple, a cure is slow and difficult. Unless, however, the true nature of the evil is quickly realised, and protective measures are taken, the reclothing of the mountains with vegetation will be a practical impossibility.

FRUIT EXPORT.

Return of Fruit Shipped from Cape Colony during June, 1908.

Port of Shipment.	Destination.	No. of Packages.	Description of Fruit.	Quantities.	Value. £	s.	d.
Cape Town ...	England	122	Oranges ...	12,000	47	17	6
" ...	"	3	Pears ...	90	0	9	0
Port Elizabeth	"	274	Oranges ...	15,526	79	0	0
" ...	"	141	Oranges and Lemons	5,025	40	0	0
" ...	"	13	Pines ...	152	4	0	0
Cape Town ...	Portuguese East Africa	50	Apples ...	1,500	7	10	0
" ...	"	50	Pears ...	1,500	7	10	0
" ...	"	21	Bananas ...	14,250	19	11	0
" ...	German South West Africa	174	Oranges ...	15,120	71	4	0
" ...	"	7	Pines ...	1,100	10	0	0
" ...	"	250	Apples ...	30,510	151	8	6
" ...	"	9	Naartjes ...	1,900	5	6	0
" ...	"	9	Lemons ...	2,300	5	10	0
" ...	"	2	Limes ...	500	1	10	0
" ...	"	51	Pears ...	4,160	21	3	0
Port Elizabeth	Other than England	282	Oranges ...	8,235	13	0	0

BEE PIRATES.

By C. W. MALLY, M.Sc., F.E.S., Eastern Province Entomologist.

The terms Bee Pirate and Bee Tiger and the Dutch term Malbij are used in connection with certain " digger wasps " which prey upon hive bees. A banded species, *Palarus latifrons*, Kohl., is the one usually referred to; but a second species, *Philanthus diadema*, Fabr., with a bright yellow abdomen, is also responsible for the destruction of a great many bees during the summer. Complaints in regard to the depredations of these two species are received every year, and it therefore seems advisable to record certain observations made by the writer during February and March, 1903. They throw some light on the work of these pests, and they are published in the hope that they will lead to more systematic observations on the part of all who have an opportunity to study them, and also that they will be of practical value to those who are striving to advance the interests of bee-keeping—an industry which, though small at present, may ere long assume considerable proportions.

THE YELLOW BEE PIRATE (*Philanthus diadema*, Fabr.).

I have designated this species the Yellow Bee Pirate because of the colour which predominates in the first impression one gets when the pirate is at work or on the wing. As will be described in detail, it makes its nests in the ground and provisions them for its young with bees which it catches on flowers.

Description.

The female measures on an average about five-eighths of an inch in length and about one inch across the expanded wings. The antennae, head, thorax, and the basal portion of the femora and of the first abdominal segment, black; face, pale yellow; first pair of legs, fuscous; abdomen, tarsae, tibiae, and the distal portion of the femora of the second and third pair of legs, bright yellow; thorax marked with three short transverse yellow bands, one on the anterior margin and two broader ones between the second pair of wings. Wings, transparent, slightly smoky in appearance, not plaited when at rest, but overlapping horizontally on the abdomen. The males are usually smaller than the females, but similar in appearance. The sexes may be distinguished by counting the number of joints in the antennae—there being twelve in the females and thirteen in the males.

The egg (Fig. 1) is white, smooth, four millimeters long and one millimeter wide, slightly curved, ends rounded. Just before hatching some of the segments of the larva can be seen.

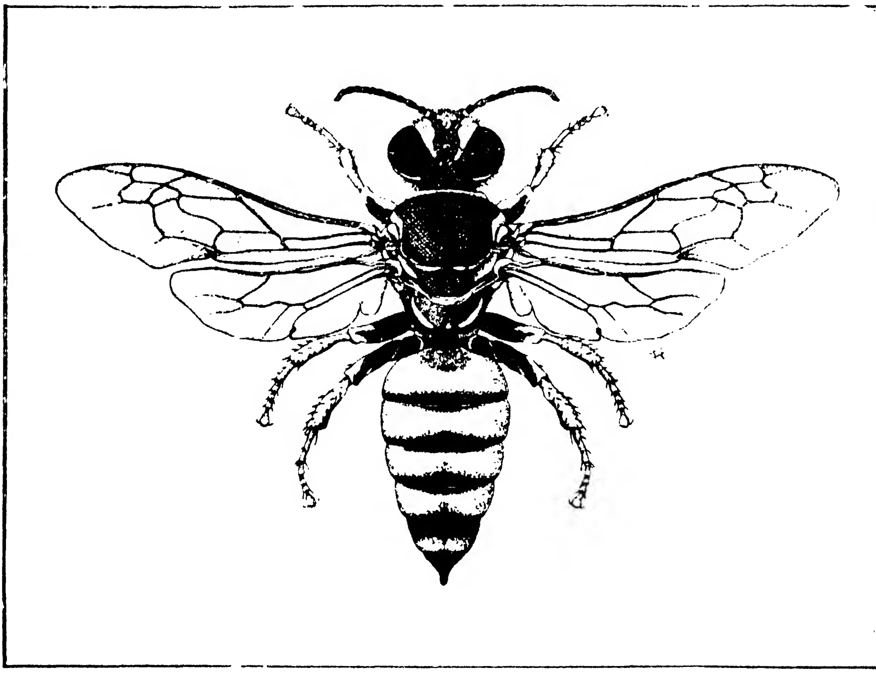
The larva (Fig. 2) is white, translucent, about one-half inch long and one-eighth inch wide when fully developed.

Figures 2 to 5 were taken from a larva which had been in its cocoon for at least ten weeks, but illustrate the transformation to the pupa stage.

The cocoon (see figure) consists of densely woven brown silk, and is formed by the larva in the same cell in which the bees are stored. The relative size and shape is shown by comparison with the other figures; all were drawn to the same scale.

Digging the Burrows.

So far as observed, the females dig the burrows, and prefer to locate them in dry, hard, sandy soil. The breeding ground where the following observations were made is located in a neglected tennis court surrounded by tall pine trees, and about 100 yards away from a stretch of native veld.



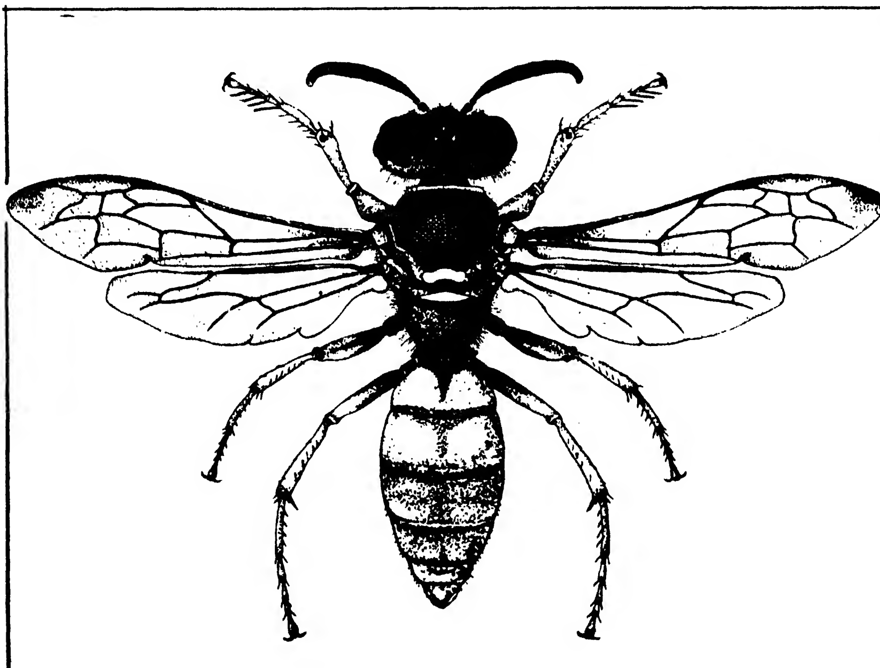
THE BANDED BEE PIRATE, *Palarus latifrons.* Female, greatly enlarged. Natural size, one-half inch in length.

In digging the burrow the female may start on the level surface of the ground, but she evidently prefers slight irregularities. The almost vertical sides of the holes which were dug in tracing the burrows seemed to be specially attractive. The soil is loosened and thrown back with the fore legs, the tibiae and tarsae of which, being provided with strong spines, serve the purpose of both pick and rake. Although no direct observations could be made, it seems likely that the jaws are also used in loosening especially difficult bits. When starting from the surface, the burrow first slopes down gradually for several inches, and then more abruptly and irregularly to a depth of four to eight inches, sometimes attaining a depth of a foot or more. They are not at all systematic in digging the burrows, but turn off in all possible directions and angles—sometimes very abruptly up or down or to one side. So far as could be determined, there was no

apparent reason for the sudden changes in direction. At other times they take a straight course downwards at an angle of about 45 degrees. Several burrows that were carefully traced were over two feet in length.

The female apparently digs along till she feels inclined to provision a cell, and then slightly enlarges the terminus, stores it with bees—three being the greatest number found in any one cell—deposits the egg, and then retreats an inch or more and starts off in another direction. The lateral cells are not very numerous, four being the most yet found along any one burrow. The soil was quite sandy, and hence it was difficult to determine the exact shape of the cell, for the sand was usually somewhat disarranged by the digging, especially as there was no telling when we would come to the end, the first indication being the appearance of a dead bee. There is no tendency to close the burrow leading directly into the cell.

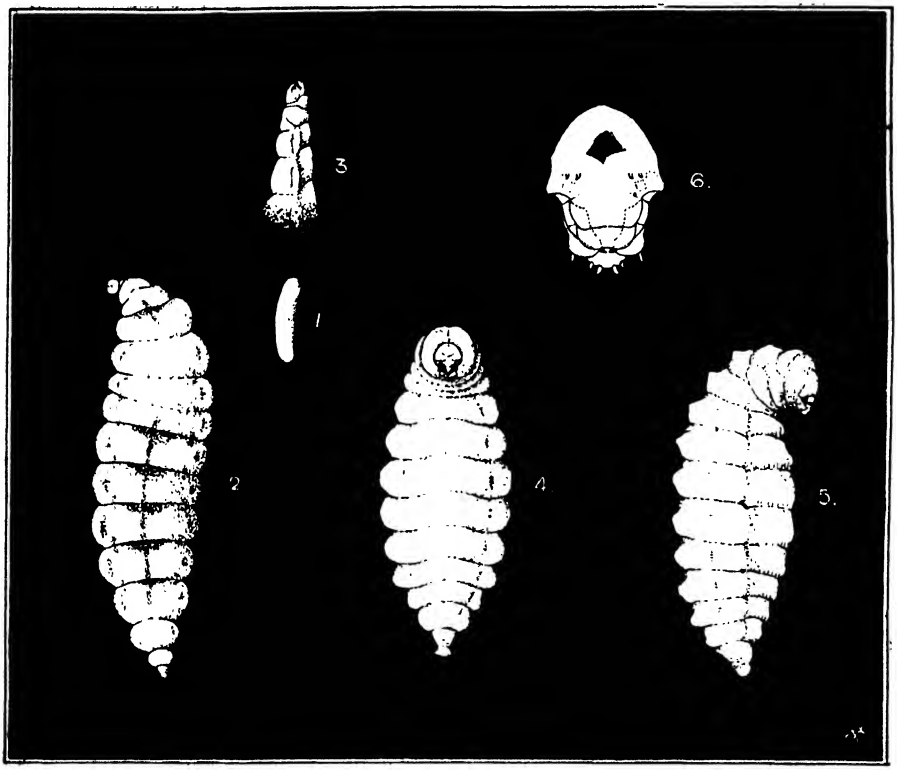
No males were observed in the act of burrowing, although one was seen to enter a burrow and close it from the inside.



THE YELLOW BEE PIRATE, *Philanthus diadema*. Female, greatly enlarged. Natural size, five-eighths of an inch. in length.

The females are not only unsystematic in digging the burrows, but irregular in other respects as well. In some cells the egg was deposited on the first bee, and in others apparently on the last one brought in. Apparently neglected cells are frequently found, and others contain the remains of only one bee, but no trace of the pirate larva or cocoon—the larva probably having perished for lack of food. Several times while tracing a burrow in which the female was known to be working, a fully provisioned cell was found, in which there was no trace of either egg or larva, the bees having dried up without any trace of a pirate larva having fed on them. This would indicate that—barring an accident to the female and the subsequent appropriation of the burrow by another—the female became confused in her work and failed to deposit the egg.

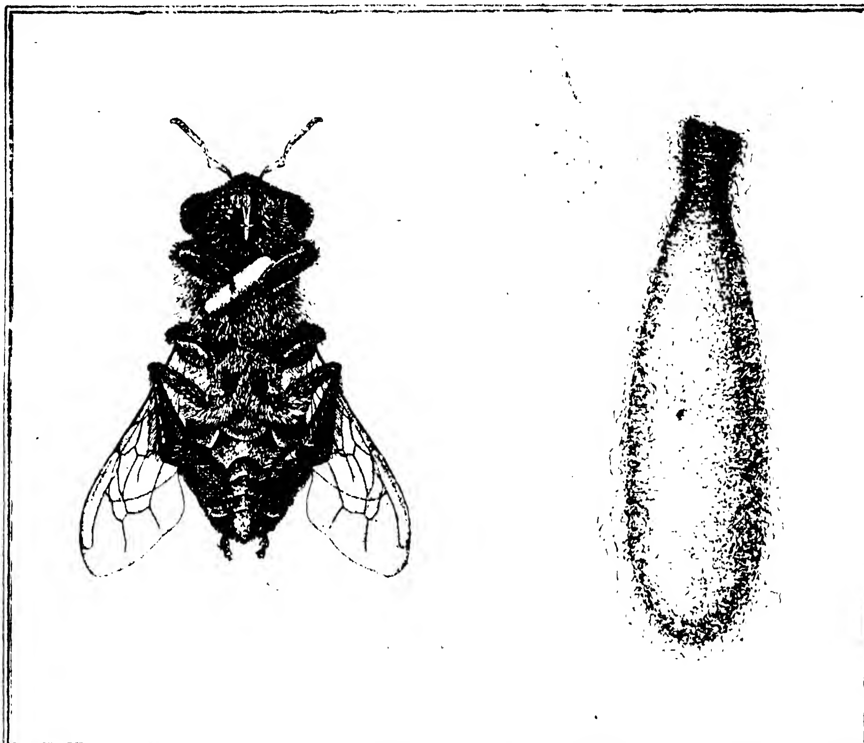
The females are strong fliers, darting about hither and thither so swiftly that the eye can scarcely follow them. They are very active on fine, warm days, and can be seen hovering about two or three feet above the surface of their breeding ground, the bright yellow abdomen glistening in the sunlight and greatly aiding the eye in following the sudden changes in the direction of flight. The female alights near the entrance to the burrow, and, without releasing her hold on the bee, enters at once, carries it down some distance, and then returns and closes the entrance with fine sand from within They never close the burrows when they leave. About sundown the burrows are closed from the inside, and are not opened till between eight and nine o'clock the next morning.



YOUNG STAGES OF YELLOW BEE PIRATE.—1, Egg; 2, 4 and 5 different views of larva. 6. View of head of larva.

When the bee-laden female does not enter the hole at once she may hover about for some little time as if to orient herself, occasionally resting on the ground, and finally approaching the opening, having kept a firm hold on the bee all the while. On one occasion a burrow had been traced for some distance to what seemed to be its termination. Suddenly a bee-laden pirate darted down and hovered over the spot where the burrow had been. She darted about, stopping here and there, but could not locate the entrance. At last, as if becoming irritated, she settled about three feet away, released her hold on the bee, darted about rather excitedly for a while, and then flew directly over the spot where the entrance had been. She evidently became confused, and alighted on the bank where I had been digging. In a moment she was on the wing again, ascended to a height

of ten or twelve feet, circled about a few times, and then went higher and higher, making greater detours, till at least twenty feet above the ground, and then darted down into the hole and explored it very carefully. She soon made strenuous efforts to work at a certain spot, but it was slightly receding, so that she could not gain a foothold. After a while she began digging a fresh burrow in the bottom of the hole, but it evidently was unsatisfactory, and she started another one by a slight irregularity on the surface. The spot in which she seemed so interested a moment before was then investigated. The first bit of sand removed revealed the presence of a bee with an egg placed across the thorax between the first pair of legs and pressed close to the body, but not fastened in any way (see figure). Two other bees were found just back of this one, there being an oval cell slightly larger than the burrow. Several other eggs were found at different times, and they were all placed in the manner just described.



Bee Victim of Yellow Bee Pirate, showing egg of the latter on its neck.

Where are the Bees captured?

It was at first supposed that the pirates captured the bees at the hive. Continued observation proved that such was not the case so far as this species is concerned. It seemed evident that they must catch them on their return flight to the hive or while they were at work on the flowers. Observations were accordingly made in an open bit of native veld near by in which flowers of various kinds were fairly abundant. A pirate was soon noticed hovering about over the flowers of *Erica persoluta.* It settled quietly, and began working its head into the flowerlets, evidently feeding

on the pollen. It was easily captured, and proved to be a male. Several other rather small specimens were seen on the flowers in the same way. Thinking that possibly they were undersized females, they were not molested. They soon darted away, never to be seen again. Two other specimens captured on the flowers proved to be males also.

In another clump of *Erica persoluta* a bee was observed to be busily at work, when suddenly a second "bee" appeared on the scene, and they tumbled to the ground together. The second "bee" proved to be a female pirate, *Philanthus diadema*. She had caught the bee by the head from in front, and was observed to deftly curve her abdomen up, and no doubt inserted her sting into the bee's head from underneath, just back of the mouth-parts. Whether the bee was stung more than once could not be determined, but it was absolutely helpless, if not dead. On being disturbed the pirate darted away to one side, but soon returned to within a foot of her victim. She then crawled about on the sticks and leaves near by for a time, and gradually went up to the bee, turned it on its back, crawled over it—head to head—grasped it with all six legs, and darted up and away towards the breeding ground.

All of the bees found in the burrows or taken from returning female pirates were carefully examined. They had not been mutilated in any way, showing that they were intended solely for the use of the larvae of the pirate. If this species does mutilate an occasional bee for feeding purposes, it evidently discards it, and only stores the larval cells with perfect specimens. In no instance was a female pirate found in the act of feeding.

Life Cycle.

No definite statement can be made in regard to the length of time required to complete the life cycle. An egg found on a bee in one of the cells was placed in a cell of damp sand along with the bee. About fifteen hours later it had hatched, and the larva was evidently trying to attach itself. It was still unattached after twelve hours, and was dead twelve hours later. On March 25th an apparently full-developed pirate larva was found along with the remains of a bee in one of the burrows. It was transferred to the laboratory and placed in a cell of damp sand along with two freshly killed bees, which were placed as nearly as possible in the same relative position as those found in the cells. The cell was then covered with a glass slide and darkened by means of a piece of cardboard, which could be easily removed for the purpose of observation. Although the larva worked its away over the bees, it did not feed. Several times it seemed to be trying to force an entrance between the abdominal segments of the bee, but failed. The next day, as there was still no indication that the larva had fed, a bee was mutilated and placed within its reach, but it showed no tendency to feed on the exposed tissue. It began to spin its cocoon March 23rd, and continued for over a week, but it failed to form a proper cocoon, and died a week later, having been under observation at least two weeks.

On January 24th a cocoon was found in one of the burrows, and when held to the light the larva could be seen within. It was left undisturbed till April 13th, when it was examined, and found to be in the stage illustrated in figures 2 to 5. It is probable that under natural conditions it would not emerge till the following spring.

Natural Enemies of the Pirate.

On several occasions dipterous puparia were found in the cells along with the remains of the bees, but there was no trace of the larva or cocoon of the pirate. In one cell six dipterous puparia were found along with the

remains of seven flies, representing *Musca domestica* and a closely related species. These dipterous remains may possibly be a coincidence due to a fly-catching wasp having tunnelled into a pirate's cell. On the other hand, it would be an easy matter for the fly-catching wasp to appropriate the unprotected burrow. This seems plausible, for once while tracing what was evidently a pirate burrow a small dark wasp suddenly darted out, and a little farther on a number of freshly killed flies were found. But if such is the case, one would expect to find the larva or cocoon of a wasp in place of the dipterous puparia. On another occasion a fly kept very close to a pirate carrying a bee into the burrow. The fly attempted to follow, but the pirate quickly drove it out and closed the burrow from the inside. Another fly was seen to dart close up to a bee-laden pirate in a way that suggested that it might be watching for a chance to deposit an egg on the bee, but if that was its intention it certainly failed.

While no clear case of parasitism was found, there seems to be nothing to prevent certain species exploring the unprotected burrows in the absence of the female pirate, and depositing eggs either for the destruction of the pirate larva directly or by devouring its food-supply.

Remedies.

As yet no satisfactory way of dealing with the species has been found. The "plate trap" which was used for *Palarus latifrons* is useless for this species on account of its different habits. The females can be easily captured with a net as they leave or return to the burrows, but this takes a great deal of time. There may be a number of breeding grounds scattered about in unexpected places, so that it would be difficult to do more than check them to a certain extent. Since they capture the bees on the flowers, it is hardly likely that there will be a serious drain on any one hive. A proportionate number of the bees will also come from wild colonies; but where a large number of bees are kept the aggregate loss may be more important, because a larger proportion of the victims will doubtless come from the hives.

THE BANDED BEE PIRATE (*Palarus latifrons*, Kohl.).

The Banded Bee Pirate, shown in the second illustration, is the pest usually referred to as the Bee Pirate or Bee Tiger. Whether it really is of any more importance than the foregoing species is uncertain; but as it haunts the hives, and is therefore often seen at its destructive work, it is the one about which most complaints are made. The writer has had no opportunity to study its habits, and cannot say where the nests are made. But, like the members of its family (*Larridae*) that have been studied. it probably burrows in the ground in much the same manner as the Yellow species, which, however, is of a different family (*Philanthidae*); and it probably provisions its nest with bees.

It is claimed by some that this species captures the ("incoming") bee, literally "cuts its throat," extracts the honey, and then discards the remains. Others claim that it is the out-going bee that is captured and carried away. I cannot verify either claim from personal observation. That this species does frequent the hives is shown by the fact that the females are so often caught in traps set for them near the hive. As high as 400 pirates have been reported as captured around one hive. The bees are also said to realise their danger, and refuse to leave the hive while the pirates are about, thus losing a great deal of time.

The following means of destroying the pirates have been suggested by correspondents at different times. Watch for the pirates and beat them

down with bushes and crush them. Or, treat the branches with "bird-lime," so that the pirate is held fast if you succeed in striking it. The branches which have been treated with bird-lime may be placed near the hive, and when the pirates settle on them to rest they cannot escape. On first thought it would seem likely that this method would catch a great many bees as well; but it is claimed that the bees do not visit the branches, but go to the hive as usual. A white plate or basin containing a little water has been found to give good results, but a little oil should be added, so that the pirates will be destroyed as soon as they drop into it. Whether they are dazzled by the glistening white of the plate or come on account of thirst and mistake their own reflection in the water for a bee and dart down after it, or whether they are fond of resting on a white surface, is difficult to say. In the latter case it would be advantageous to place dark soil for some distance around the plate so as to make it more conspicuous.

Through the kind co-operation of Dr. E. A. Nobbs, who assisted me very greatly while making many of the above observations, I was enabled to get the daily records from several plates that were placed in front of hives that were said to be seriously molested by pirates. The following is a list of the captures:—

February 1st.—Plate 1, water and paraffin, 3 pirates.
February 1st.—Plate 2, water and paraffin, 6 pirates, 1 bee.
February 1st.—Plate 3, water and olive oil, 6 pirates.
February 3rd.—Plate 1, water and paraffin, 5 pirates, 2 bees.
February 3rd.—Plate 2, water and olive oil, 3 bees.
February 4th.—Plate 1, water and paraffin, 2 pirates, 1 bee.
February 4th.—Plate 2, water and paraffin, 1 pirate.
February 5th.—Plates 1 and 2, water and paraffin, 11 pirates, 10 bees.
February 7th.—Plate 1, water and paraffin, 1 pirate.
February 8th.—Plate 1, water and paraffin, 4 bees.

Total, 35 pirates, 21 bees.

Of the 35 pirates, 31 were females and the remaining 4 males. Since the great majority of the pirates were females, it indicates that they are responsible for the destruction of the bees, and that the males were present perhaps by chance. The bees may have been attracted by the water, or they may have been captured by pirates, which then dropped into the plate; but this would not hold for February 3rd, plate 2, and February 8th, plate 1, when bees only were taken. The number of bees destroyed by the plates as shown above is no doubt small in comparison with the number of bees that would have been destroyed by the 31 female pirates in the same time. The plates were kept in order up to February 15th, but as no pirates were taken after the 7th the observations were discontinued. Whether the failure was due to the colony of pirates having been stamped out, or to some other cause, it is impossible to say.

From the above test I am inclined to believe that the "plate method" is the simplest and most effectual way of fighting the banded pirate, *P. latifrons*, because it requires the minimum of time and the materials needed are simple and available everywhere. After the plates have been placed in position they need only be examined in the morning to remove the dead specimens and replenish the oil and water, if necessary. Paraffin is better than olive oil, because it spreads over the water more evenly, and does not become rancid.

DANGERS OF FERMENTING VATS & WINE TANKS.

A WARNING.

By Dr. C. F. Juritz, Senior Government Analyst.

When grape juice ferments, the sugar which it contains breaks up into a liquid—alcohol—and a gas—carbon dioxide, or, as it is popularly called, carbonic acid. This carbonic acid is a very heavy gas; it is one and a half times heavier than air, and can, in fact, be poured like water from one tumbler, or other vessel containing it, into another. It is easy to understand, therefore, that carbonic acid has a tendency to accumulate in the large tanks or vats in which it is formed when wine ferments. If such a tank has become partly filled with this heavy poisonous gas, we may lower a bucket into the stratum of gas and draw out some of the latter just as when drawing up water from a well; when the bucket comes to the surface, we may place a lighted candle in it, and find, provided there be a large enough proportion of the gas, that the flame is extinguished.

A few months ago, a boy employed on a farm in the Caledon Division, went down by a ladder into a cement wine tank of 27 leaguers' capacity, for the purpose of cleaning it. At the time the tank contained about three leaguers of water and some wine residue. The air in this tank had been quite sound and breathable a fortnight before, but during the fortnight the tank had been closed and unventilated, and about two minutes after the boy descended into the tank (or, as another eye witness declared, immediately he reached the foot of the ladder) he fell on his back unconscious. Another young man went down to the assistance of the first, and he too fell down unconscious. A third man then descended, but became unconscious when half way down the ladder, and would have fallen had a fourth at the top not retained grasp of his hand and drawn him up. The fourth man then went down, but beginning to lose consciousness, had to ascend again at once without the bodies of the first two; these were ultimately got out by a hook attached to a rope, life being then already extinct.

Some weeks after the above occurrence, another case of similar nature was reported; on this occasion the Worcester Division was the scene of the fatality. Three men had been instructed to clean out an empty cement wine tank in a cellar. The tank was opened, a ladder put down, and one of the men descended, remarking on the "mustiness" of the air within. The others withdrew the ladder, but almost immediately heard the first man fall, whereupon the second man jumped into the tank, but was obliged to come out again at once, and on replacing the ladder he made an unsuccessful attempt to remove the first victim, being assisted herein by the third man, who also fell down unconscious in the attempt. Further assistance being obtained, a fourth person entered the tank, and attaching leather thongs to the prostrate men, succeeded in getting them hauled out. On emergence, one, it was said, gave a final gasp and died; the other ultimately recovered.

The District Surgeon subsequently made a *post-mortem* examination, and in the course of his report stated that when he viewed the body its surface "was still warm in spite of its having been laid out in a tin shanty, in cold weather, and notwithstanding that death was reported to have occurred some seven or eight hours previously." This observation is of interest in connection with the following statement quoted from Taylor's "Principles and Practice of Medical Jurisprudence," 1905 Ed., Vol. 2, p. 571: "The body of a person who has perished from the inhalation of carbonic acid is said to retain the animal heat, *cæteris paribus*, for a longer period than usual; and hence, according to Orfila, cadaveric rigidity does not commonly manifest itself until after the lapse of many hours." To this the author adds the remark that "there is no reason to believe that this mode of death affects the rate of cooling, or the access of rigidity."

Fatal results, under circumstances similar to the above, have often been recorded in connection with well-cleaning and well-sinking, in breweries, aerated water factories, sewers, and even ordinary cellars, especially if the latter contained damp straw or sawdust. In such cases the poisonous gas is usually found at the bottom of the well, vat, or cellar, or close to the soil. In connection with the cleaning out of brewers' vats, and of sewers especially, many fatal cases have been recorded, and it is well therefore to sound a warning against the dangers of which many seem to be quite unaware.

It has often been stated that, if a candle will burn in air supposed to contain carbonic acid in dangerous quantity, it is a satisfactory proof that such air can be breathed with safety, and that therefore the best test of the purity of the air in a vat is to lower a burning candle into it before descending one's self. With regard to this it may be said that while there is no doubt that the extinction of the candle flame would conclusively prove the atmosphere of the tank dangerous, one cannot always argue that the air is quite safe when the candle continues to burn: a case, for instance, is recorded* where a servant, entering a cellar in which grape juice was fermenting, was suddenly seized with giddiness. She dropped her candle on the floor, but had time to leave the cellar and shut the door behind her before she fell down senseless. Those who went to her assistance found, on opening the door, that the candle was still burning. Other cases bear out the same conclusions, and it appears, from experiment, that candles will burn in air in which as much as 10 or 12 per cent. of carbonic acid is present: in such air human beings would soon experience giddiness, unconsciousness, and ultimately death. When 5 or 6 per cent. of carbonic acid is present in the air a candle will continue to burn very freely, but serious symptoms will probably ensue if such a mixture be breathed for a short while.

It should be almost unnecessary to add that, in cases of unconsciousness arising from inhaling carbonic gas, the first essential towards restoration is fresh air, and the next is that artificial respiraton should be applied immediately if natural breathing is feeble or has ceased. It is also obvious that, to avoid accidents, precautions should be taken to ventilate as thoroughly and efficiently as possible any fermentation vat or tank regarding which there may be the least suspicion, before entering the same for cleaning purposes.

In the Worcester case above mentioned it was reported that the deceased still made efforts to breathe when brought up into the fresh air; it is probable, therefore, that the immediate application of artificial respiration would have saved his life. With the increasing use of large fermentation tanks of the type of those which caused the fatalities above recorded, it is possible that yet further accidents of similar nature may

* Taylor's "Princip'es and Practice of Medical Jurisprudence," 1905 Ed., Vol. 2, p. 569.

occur. In view of such contingencies the following transcription of Dr. Sylvester's method of applying artificial respiration may prove of value:—

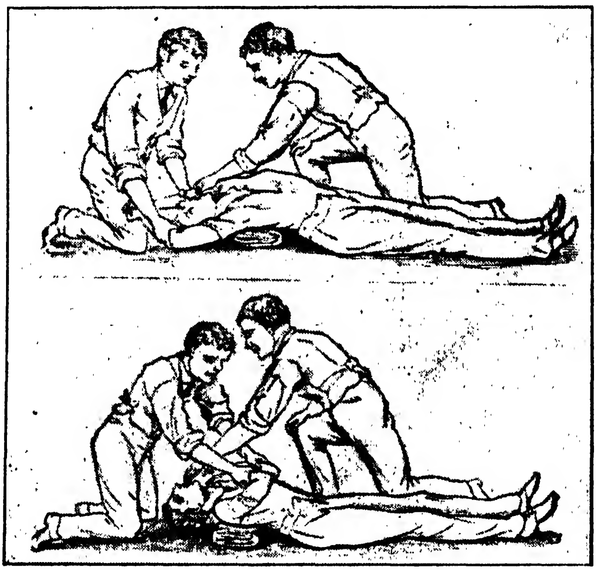
RULE I.—*Adjust the patient's position.*

Place him on his back, flat on the ground. Remove all tight clothing from the neck and chest, especially the braces, and make bare the front of the body down to the pit of the stomach.

RULE II.—*Obtain and keep a free access of fresh air into the windpipe.*

Raise the head and shoulders, and support them on a small cushion or folded article of dress placed under the shoulder blades. Open the mouth and get someone to draw the tongue as far forward as possible, and keep holding it forward.

Inspiration.



Respiration.

RULE III.—*Imitate the movements of breathing.*

1. *Induce inspiration.*—Kneel down just behind the head, grasp the arms just below the elbows, and draw them gently and steadily upwards, outwards, and towards you, making the elbows almost touch the ground on either side of the head, or crossing the forearms over the top of the head. Keep them in this position for two seconds. This will enlarge the cavity of the chest and draw air into the lungs.

2. *Induce expiration.*—Bring the arms slowly forwards, downward, and inward, press the arms and elbows gently and firmly against the sides of the chest for two seconds, about four or five inches from the breast bone. This will expel the air from the lungs again.

Keep repeating these two movements alternately, about fifteen times every minute, until breathing becomes spontaneous, when the artificial respiration should be regulated to correspond with the natural effort. If evidence of life does not soon appear, these endeavours should, nevertheless, not cease. Hopes of restoration may be entertained even after two hours have elapsed.

AGRICULTURAL UNION OF CAPE COLONY.

ELEVENTH ANNUAL CONGRESS.

(Continued from Page 81.)

Agricultural Shows and Judging.

Mr. Noble Jack (Director of Agriculture), on the agenda being taken up, suggested that the following motions should be referred to a special committee for consideration and report:—

Section 1, Sub-section (c) (Queenstown): "That a uniform scale of Entrance Fees be agreed upon for different classes of stock, in proportion to the value of the prizes offered." *(d)* (Queenstown): "That stock exhibited at Agricultural Shows, more particularly sheep, be classified in a uniform manner throughout all prize lists of Agricultural Societies, so as to give exhibitors a better opportunity of showing their stock at less expense and trouble than at present." *(e)* Cape Stud Breeders' Association): "That the Government be requested to withdraw the regulation in regard to Agricultural Shows, in terms of which no animal or exhibit is allowed to draw more than three prizes during any one season."

Section 2.—The Status of Judges at Shows.—*(a)* The Executive will submit a memorandum with correspondence on the above subject with suggestions that a Judges' Section of the Agricultural Union be formed or if preferred a separate Judges' Association, also lists of Accepted Judges: (1) With the view of assisting Agricultural Societies to obtain Judges; (2) the training of young men to take up the work of judging; (3) the introduction of short lectures and demonstrations at Agricultural Shows; and (4) with the further object of adopting such methods as will enable the Judges to publish fuller details as to their reasons for awarding prizes. *(b)* (Robertson and Montagu): "That the Union draw up an official list of Judges, such Judges to be recommended as competent by the societies of which they are members."

Section 3.—Single Judges and Judging by Points.—*(a)* (East London): "That the judging at Agricultural Shows be by points, and that the single judge system be adopted." *(b)* (Bredasdorp): "That judging by points at Agricultural Shows in the merino sheep, angora goats and wool sections is desirable, scale of points to be taken from the South African Stud Book; and that it be compulsory that the number of points scored by each exhibit be given to the exhibitor." *(c)* (Executive): "That this Congress again affirms its adherence to the single judge system at Agricultural Shows, and strongly recommends the adoption of the point system in judging, and that for live-stock the scale of points adopted by the South African Stud Book be accepted."

Section 4.—"Grassfed" or "Unhoused" Sheep.—(King William's Town): "That it is desirable that some recognised definition should be established as to the meaning of the terms 'Grassfed' and 'Unhoused' Sheep in Show prize lists."

This suggestion was adopted and the folowing Committee appointed: Messrs. T. T. Hoole, D. J. de Wet, C. Neethling, J. J. McNally, E. M. Warren, J. Starke, F. C. Bayly, R. Starke, J. Woodin, J. Rawbone, J. D. Albertyn, C. P. Hill, G. H. Maasdorp, J. D. Borthwick, C.V.S., A. W. Douglass, P. A. Myburgh, E. T. L. Edmeades, J. D. Hugo, T. A. Stephen, Colonel W. J. Warren, and the mover, J. N. Jack.

Congress then adjourned for lunch. On resuming for the

AFTERNOON SITTING,

Mr. Heatlie moved: "That the Congress respectfully request the Government to assist such Agricultural Societies as are not in possession of permanent Show Grounds, to acquire same." Seconded by Mr. Hugo, and carried.

Mr. De Wet moved: "That the Railway Department be requested to allow one caretaker's ticket for each £250 worth of live-stock forwarded by rail to Agricultural Shows." Mr. Marais seconded. After discussion, the motion was lost.

Through Booking and Rail Concessions to Shows.

Mr. Woodin moved: "That Congress points out to the Commissioner of Railways, with a view to preventing a misunderstanding on the part of passengers who avail themselves of railway excursion fares in the O.R.C., Transvaal, and Natal, to visit Cape Colony agricultural shows, the urgent necessity in future to advertise on the Colonial South African Railways and Natal administrations especially, the 'through fares' from the various C.S.A.R. and Natal stations to the main agricultural show centres of the Cape Colony."

Mr. F. Douglass said there was a new Minister of Railways, and he thought a deputation should wait on him before the Congress finished.

Mr. Woodin said he was prepared to accept Mr. Douglass's rider.

The motion was agreed to.

Mr. Myburgh (Western Province) moved: "That this Congress deplores the decision of the Government to withdraw the concession allowing visitors to agricultural shows to travel at half single fare. This Congress would point out that as the Government grant has been so considerably diminished, and is, it is understood, likely to be still further reduced, agricultural societies have now to depend upon gate money as their main source of revenue, and if the concession referred to be withdrawn, their revenue will seriously suffer. This Congress would also point out that the educative value of shows will be minimised unless special facilities be afforded visitors from the country districts to attend; and Congress feels sure that owing to the large number of persons who usually availed themselves of the facilities provided in the past, the traffic should pay the Railway Department."

This resolution was also adopted, and it was decided that the Executive arrange for a Deputation to present this and two previous resolutions to the Commissioner of Railways.

Show Dates for 1904.

The memorandum drafted by the Secretary on this subject, and previously circulated among the various Agricultural Societies, was submitted by the Executive. In this the following approximate dates were offered for discussion. —Tuesday, January 26: Paarl. Thursday, January 28: Stellenbosch. Tuesday, February 2: Tulbagh. Thursday, February 4: Bredasdorp and Bayville. Tuesday, February 9: Worcester, Bathurst and Aliwal North. Thursday, February 11: Robertson, Humansdorp, and Queen's Town. Tuesday, February 16: Caledon, Middelburg, and Cathcart. Thursday, February 18: Malmesbury, Graaff-Reinet, and Molteno. Last week in February: Rosebank and Dordrecht. Tuesday, March 2: King William's Town. Thursday, March 4: East London. Tuesday, March 9: Cradock. Thursday, March 11: Graham's Town. Third week in March: Port Elizabeth. As the other probable Shows would not be likely to clash, their dates were left open to be arranged according to local requirements.

Some discussion followed, when it was decided to adjourn the debate till the following day.

Shipping Freights on Live-stock.

The question of shipping freights on live-stock was brought up by the Executive Committee, who presented the following memorandum on the subject: "For some time past the stock-farmers have been agitating for a reduction in the freight charges on live-stock imported from Europe. The subject has been frequently discussed, but very little satisfaction has resulted. Last year the whole case was very fully stated in a letter received through the Port Elizabeth Agricultural Society from Messrs. Wm. Cooper and Nephews, who pointed out how the high rates hamper pastoral development. This matter was brought to the notice of the Hon. the Treasurer of the Colony, in a letter giving full details. The Treasurer, recognising the importance of the subject, made representations to the Union-Castle Co., and forwarded copies of letters to this Union. But nothing further has been heard of the matter. It was also brought before the Inter-Colonial Union."

Mr. Jack moved:—"That the Government be approached with a view to getting a reduction in the exorbitant shipping freights charged for the conveyance of live-stock to this country." Seconded by Mr. Myburgh, and carried.

Closer Union.

The Executive Committee submitted the following memorandum on closer union with other bodies: Since last Congress further negotiations have proceeded with reference to the suggestions for closer union with other bodies. The developments include the adoption by the Central Association (Farmers' Congress) of a series of resolutions in favour of the establishment of a Chamber of Agriculture. At the invitation of that body, this Union was represented at a Conference at Port Elizabeth in March last to discuss these proposals. The outcome of that Conference was published widely at the time, and the Department of Agriculture circulated the minutes among all the farming organisations of the Colony. The attitude then taken up by the Union is still considered by your executive to be the right one in such a case. Though we are, and always have been, most anxious to fall in with any serious and reasonable scheme of closer union, it is impossible for this body, constituted as it is, to delegate to any other organisation or section of an organisation the sole right

to discuss and decide upon all farming questions. Had the amendment proposed at the Port Elizabeth Conference, giving freedom of discussion to every constituent body of the proposed Chamber of Agriculture, been accepted by the representatives of the Central Association, the whole question might now have been well on the way towards final settlement. The representatives of the Western Province Board of Horticulture present at the Conference accepted the principle unreservedly, and the Western Vine and Fruit-growers' Congress, held last week, not only endorsed that policy, but went further, and in their attitude on this question, sweep away the whole idea of spheres of labour, substituting in its place a much broader principle. The resolution carried by that body in place of the suggested "spheres of labour" reads: "That each body affiliated to the Chamber of Agriculture shall have the right to discuss all agricultural subjects, but that all decisions arrived at shall be forwarded to the Chamber of Agriculture for action." This shows that the leaven is gradually working, and it is to be hoped that, now we have taken this further step in the way of advancement, the day is not far distant when the proposed Chamber of Agriculture will be an accomplished fact, based on the broadest possible principles. A general agreement is on record as to its necessity and desirability. The details should not present insuperable difficulties.

Mr. Shaw Nicholson said there had always been great difficulty in getting the various bodies to unite. The matter had been before the Horticultural Congress last week, and as a result, he saw they had advanced a step further. When it came to details, he thought the best thing to do would be to talk the matter over at a round table. He moved that the resolutions be accepted, as adopted by the Horticultural Congress.

The Secretary said representatives from the Horticultural Congress were expected to attend by invitation to discuss this matter. They would be in town next day. The debate was accordingly adjourned.

The Points of Merino Sheep.

Mr. Warren moved, seconded by Mr. Clarke: "That this Congress considers a revision of the Stud Book scale of points for merino sheep is necessary, as the present scale is not in the interests of the wool industry."

The President said the scale of points adopted by the South African Stud Book took some time to compile, and of course nobody thought for a moment that it was perfection. But it was only by arranging such a scale that the faults could be found out. He suggested that a small committee of sheep-breeders go into the matter and bring up a report.

Mr. R. Starke thought the scale of points would have to vary, because the points for a wool sheep would not be of much use in a slaughter sheep.

Mr. Starke moved: "That this motion be referred to the special committee appointed to deal with the show and judging questions."

This was agreed to.

Stud Book Registration at Shows.

Mr. De Wet moved: "That a representative of the Cape Stud Breeders' Association attend at agricultural shows to enter stock in the South African Stud Book." He thought such a course would mean a great saving of time and expenditure.

Mr. Gie seconded and discussion ensued. Ultimately the following amended resolution was adopted: "That this Congress recommends that an official of the Cape Stud Breeders' Association attend agricultural shows,

if desired, to examine stock for registration in the South African Stud Book; that 30 days' notice be given and the society asking for same to undertake to pay all expenses.

The Education Act.

Mr. Albertyn moved: "That the Education Act be so amended that the burden of taxation does not fall entirely on the landowner."

Mr. Edmeades seconded, and a lengthy discussion ensued. The resolution was adopted in the following form: "That the Education Act be so amended that the burden of taxation for the half share of deficits in School Boards does not fall exclusively on the landowners."

Mr. Albertyn moved that all such seeds as are required for the improvement of the Colony be allowed to come in duty free at the ports, and be carried free on all railways.—The motion was lost.

Vermin-proof Fencing.

Mr. Albertyn moved, seconded by Mr. Le Sueur: "(1) That all Divisional Councils be empowered to erect vermin-proof fences on the boundaries of their division. (2) That it shall be compulsory for all Divisional Councils to bear half share of cost of fence, and half share of maintenance of such fence when erected on the boundary of its division by adjoining Divisional Councils. (3) That all landed proprietors shall be responsible to their respective Divisional Councils for quarter share of fence and quarter share of such maintenance of such fence where erected on the boundaries of the land of two adjoining landowners. (4) That where fences are already erected on the boundaries of two divisions the proprietors thereof shall receive remuneration, according to arbitration, from their Divisional Council, the material of the fence to become the property of the Divisional Councils, who shall have the right of control of such fence as long as it is required for the purpose for which it was erected, but shall not remove same without the consent of proprietor of ground on which it stands. (5) Government to pay on Crown lands on the same basis as private owners. (6) When the division is so fenced in the Divisional Council thereof shall aid in the extermination of such wild animals as are considered necessary by the Council on the £ for £ principle. (7) That such Divisional Councils shall be empowered to raise loans and obtain money at the cheapest rate of interest, and to add to the existing rates, if necessary, to cover the additional expenditure."

After discussion, the motion was declared lost, and the following resolution, moved by Mr. Bayly, seconded by Mr. Joubert, was carried: "That Government be asked to place a sum on the Estimates, to advance to farmers on repayment, on the principle of a sinking fund, for the purpose of constructing jackal-proof fencing." Congress then adjourned, resuming at 8 p.m. for an

EVENING SITTING.

Mr. Le Sueur moved: "That the same facilities should be extended to the exporters of oats as are extended to the exporters of maize and fruit." Seconded by Mr. P. H. Swart. During the discussion,

Mr. Struben moved, as an amendment: "That the Government be urged to grant no facilities for the export of any South African produce for which a profitable use can be found in this country, but should export be assisted, the same facilities should be granted to all produce, and that standardisation should be insisted on."

The amendment was lost, and the original resolution carried.

Mr. Le Sueur then moved: "That it is desirable that some further action be taken by the Government to place the wool industry on a more satisfactory basis, and whether same will not be assisted by Government granting export facilities to producers under suitable regulations, similar to those granted to exporters of fruit under Government inspection and brand." Mr. P. H. Swart seconded.

After discussion, the motion was withdrawn.

Agricultural Education.

Mr. Hill moved, seconded by Mr. Clarke: "The consideration of the advisability of establishing an Agricultural College somewhere in the Eastern Districts or Border, in view of the fact that students from those parts would thereby attain a more thorough and practical training than they have available at present, owing to the fact that climatic conditions are so diverse between the Eastern and Western portions of the Colony." He explained the great differences in the conditions in farming in the Eastern and Western Provinces.

The Hon. P. W. Michau explained that the Government had no money to comply with the wishes of the people of the East.

Mr. Clarke emphasised the necessity for such a school, and said the Government would have to find the money to establish such a college.

Mr. Noble Jack supported the motion, and said that if they had had another college next to Elsenberg in the past year they could have filled it. He did not see why they should have to go to Government; surely some of the wealthy men in the country had sufficient patriotism to come forward and help such a project.

It was explained that a similar resolution was passed last year, and Mr. Hill agreed to the affirmation of this, withdrawing his resolution in favour of it.

The Congress then adjourned until the next morning.

SECOND DAY.—TUESDAY, JUNE 22.

Congress resumed at 10 a.m., the chair being taken by the Hon. Dr. T. W. Smartt, M.L.A., in the absence of the President.

Agricultural Show Matters.

The motions on the agenda affecting Agricultural Shows, postponed from the previous day's sitting, were taken first.

Mr. Clarke moved: "That the number of Agricultural Shows should be curtailed or reduced." Seconded by Mr. McNally.

Mr. Shaw Nicholson moved, as an amendment: "That the number of open shows should be limited."

Mr. Rademeyer moved, as a further amendment: "That this Congress expresses itself strongly in favour of the holding of local shows as at present, and the contribution of Government grants on the basis of five-eighths of the prize money actually paid out; and does not consider that the interests of agriculture will be served as well by the substitution of circle shows."

Mr. Stephen suggested that all words in Mr. Rademeyer's amendment after the word "present" be deleted. Mr. Rademeyer accepted this.

Mr. Malleson moved that Government assistance to Agricultural Shows should be graduated as "Local," "District," and "Open to South Africa," but that the local shows be fostered.

Discussion ensued at some length, and on going to the vote, Mr. Rademeyer's motion, as amended, was carried, reading: "This Congress expresses itself strongly in favour of holding Local Shows, as at present."

The Show Dates for 1909.

The adjourned debate on the Show Dates for 1909 was the next business.

Mr. McNally moved, seconded by Mr. Clarke, that this subject be referred to a committee.

Mr. Edmeades moved that the dates be accepted. Seconded by Mr. Neethling.

After discussion, it was resolved, on the motion of Mr. Clarke, seconded by Mr. McNally, that the debate be again adjourned to allow of further consultation between the delegates.

The Hon. Dr. Smartt being called away, Colonel Stanford was voted to the chair, in the absence of the President. Colonel Stanford introduced the question of support for the South African National Union, and briefly outlined its objects, which he stated were to encourage in South Africa the consumption of the produce of the farmer, and to distribute pamphlets bearing on the subject.

Committee's Report *re* Judging, etc.

The report of the committee appointed to consider various motions regarding agricultural shows and judging by points, etc., was submitted, as follows:—

Section 1, Sub-section (*c*).—Entrance Fees for Stock.—This motion was withdrawn by Queen's Town on account of its unpracticability.

Section 1, Sub-section (*d*).—Classification of Stock.—The committee recommend that this matter be referred to a special sheep committee to be appointed by Congress.

Section 1, Sub-section (*e*).—Limitation of Prizes.—The committee recommend that Congress do not request Government to withdraw its restrictions.

Sections 2, 3, and 4.—The Status of Judges at Shows. Single Judging and Judging by Points. Grass-fed or Unhoused Sheep.—The committe recommend that Congress request the executive of the Agricultural Union to take steps to form an association of accepted judges for various stock sections. The list of accepted judges to be placed in the hands of all affiliated societies. The committee further recommend that the said Judges' Association be requested to formulate a scale of points to apply to the judging of the different classes of live-stock.

Mr. Clarke thought that, as the question of judging on points was so important, it should be carefully considered.

Mr. Noble Jack said his idea was to draft a scale of points before the Congress adjourned, but owing to the business to be transacted, that was found impossible. They hoped to have a list by next Congress, when probably things would have improved. It was a big question, and required a lot of consideration.

The report was adopted.

The President, having returned, again took the chair.

The Scab Acts.

Mr. Versfeld moved: "This Congress is of opinion that the administration of the Scab Acts should be in no way relaxed or weakened, and that instead of a reduction in the number of inspectors, the Chief Inspector and his staff should be maintained and the power increased."

Mr. Fairweather seconded the resolution, which, after discussion, was withdrawn.

Mr. Struben moved: "That seeing that very slow progress is being made under the present Acts in the work of eradicating scab, this Congress is of opinion that legislation should be passed enabling the Governments to clean the Colony block by block, and that in so doing consideration be given to the following: (1) The arrangement of the blocks so as to interfere as little as possible with the marketing of stock and the removal of stock from districts in which drought may at the time prevail. (2) The dipping of all stock in each block twice under Government supervision. The supply of the dip for this purpose by the Government free of charge. (3) The prevention of re-infection of clean blocks."

Mr. J. Clark said the only way to make farmers keep their sheep clean was to charge them 6d. per head for each scabby sheep.

Mr. Stephen strongly objected to the Government being asked to provide dip, and moved that words referring to this matter be deleted from the motion.

After discussion, the debate was adjourned for the attendance of the Chief Inspector of Sheep.

Soil Investigation.

Colonel Stanford moved, on behalf of the Western Province Agricultural Society: "That the Government be urged to again take up the systematic investigation and analysis of Colonial soils." Mr. Ryan seconding, the motion was carried.

A Locust Destruction Tax.

Mr. Struben moved: "That a special locust destruction tax be levied on all properties in the locust zones, and that the proceeds, along with any amount voted by Parliament from the general revenue, be expended by Government on the destruction of locusts directly by Government servants." Mr. Malleson seconded.

Colonel Stanford disagreed with the principle of taxation in this matter.

Mr. Noble Jack considered this was essentially a matter to refer to the Inter-Colonial Conference, for it was hopeless to attempt to deal with this matter without combined action.

Mr. Struben withdrew his motion, and it was agreed to refer it to the Inter-Colonial Conference.

Congress then adjourned for lunch, and resumed again at 2.15 for the

AFTERNOON SITTING.

The Chief Inspector of Sheep being in attendance, the debate on the Scab Acts was resumed.

Mr. Davison said there were two methods of getting rid of scab, one was to make the owner clean his stock and the other to clean the country block by block. If the latter system were adopted, then they would be under the supervision of Government inspectors. They would, of course,

allow any cleaned stock to leave the block, but others could not be removed. The course to adopt would be to commence in the centre, and work to the coast. If this was done it might be more costly, but it would be the best way of conducting the campaign.

The Chairman said that a Calvinia sheep farmer, who, although not a delegate to the Union, as there is no branch there, was present, and asked if he could be allowed to give an idea of the difficulties experienced in that district in attempting to clean the country of scab. Of course, it was not the right course to adopt, but on such an important point they should get all the information possible.

Mr. Van der Merwe, the farmer referred to, speaking in Dutch, detailed the difficulties in such a dry district in combating scab.

Mr. Struben's motion was agreed to, he having agreed to withdraw the clause asking for Government aid.

Mr. Struben moved, seconded by Mr. Bayly: "That the present lists of proprietary dips be abolished, and only lime and sulphur and caustic soda and sulphur be recognised by the Government as effective scab-destroying preparations."

Mr. Swart moved, as an amendment: "That Government be urged to carry into effect as soon as possible a scheme of compulsory simultaneous dipping in infected areas with recognised dips only."

The President ruled the amendment out of order, and on going to the vote the original motion was carried.

The Eradication of Prickly Pear and Jointed Cactus.

Mr. A. W. Douglass moved, seconded by Mr. Theunissen: "That, having regard to the high cost of eradicating prickly pear, relative to the value of the ground, arsenite of soda for this purpose be supplied by the Government at half cost: and that in view of the rapid spread of jointed cactus and the immense injury being done thereby to the pasturage of the Colony, and the urgent need for effective action, half the expense of extirpation be borne jointly by the Divisional Council and the Government."—Carried.

Bars in Ostrich Feathers.

Mr. Jurgens moved, seconded by Mr. Richards: "That this Union ask the Government to provide a larger grant to Professor Duerden for carrying out his researches *re* bars in ostrich feathers, and that he should be supplied with at least fifty birds to experiment with."

Mr. A. W. Douglass suggested that all words after "ostrich feathers" should be omitted, as there were serious difficulties in the way.

This suggestion being adopted, the motion was carried as amended.

Closer Union.

The President announced that the representatives of the Western Vine and Fruit Growers' Congress were present, and introduced Messrs. C. W. H. Kohler (President), P. J. Cillie, and A. A. Persse (Secretary).

Mr. C. W. H. Kohler, President of the Western Province Fruit Growers' Congress, said that when he accepted the invitation to be present he thought the President of the Central Farmers' Association would also be present. An influential meeting was held at Port Elizabeth, at which the Agricultural Union was represented. At Port Elizabeth it was felt that there should be a Chamber of Agriculture, which would do away with the petty bickerings. There was also a resolution by which the three bodies decided to come in together. He thought the resolutions adopted

there were of the utmost importance. All felt that there must be some closer union. After the resolutions were carried, the Conference went back to the resolutions carried at a previous Conference at Cape Town. They detailed the work to be done by the Congress. Mr. Kohler (continuing) gave an idea of the work done in this direction at the Fruit Growers' Congress. These resolutions provided for a new body—a body that had not hitherto existed—a Chamber of Agriculture, which would include the bodies now in existence and any others that wished to join it. It was in a spirit of compromise and a wish to further the interests of the country that they had brought this matter forward.

Mr. Cillie, who spoke in Dutch, also advocated closer union.

Mr. Kohler suggested that if the principles were adopted a committee might be appointed to settle the minor details.

Mr. Shaw Nicholson moved: "That the resolutions adopted at Port Elizabeth, together with the additional resolution carried at the Western Vine and Fruit-Growers' Congress, be adopted." Mr. I. H. Perold seconded.

Mr. Kohler thought the Government should be approached and asked to recognise the Chamber of Agriculture.

Mr. Noble Jack said this should be a last resort if the other societies failed to come in.

The Chairman, in putting the resolution, said it was a very important matter, and he trusted had had thorough consideration.

The motion was then put, and carried unanimously.

The motion was carried as follows; it was moved by Mr. Nicholson:—

"1. That it is the opinion of this Congress that the time having arrived for the better representation of the various agricultural interests and industries of this Colony, a strenuous and earnest effort should be made to co-ordinate the activities of the various bodies now existing.

"2. That it is desirable to form a body to be known as the Chamber of Agriculture of the Cape Colony.

"3. That the original constitution of this Chamber should be such as to include representatives from all recognised existing bodies (*i.e.*, the Central Association, Agricultural Union, and the Horticultural Boards) established for the purpose of advancing and encouraging agriculture in all or any of its branches in this Colony, and to make arrangements for the representation of the same in all inter-State relationships.

"4. That the said Chamber when established should also be the recognised medium of communication between all the aforesaid bodies (viz., the Central Association, Agricultural Union, and Horticultural Boards, and any other body that may be affiliated afterwards) and the Government.

"5. That each body affiliated to the Chamber of Agriculture shall have the right to discuss all subjects pertaining to farming, but that all resolutions arrived at affecting the general body shall be forwarded to the Chamber of Agriculture for action."

A hearty vote of thanks was passed to the representatives of the fruit growers for their attendance.

Mr. Malleson moved, seconded by Mr. Struben: "That the further negotiations be left to the Executive, with power to act, and to consider, in conjunction with the other bodies concerned, further details of the constitution of the proposed Chamber of Agriculture."

Veterinary Surgeons.

Mr. Struben moved a resolution asking the Government to devise a scheme for the establishment in the chief town of each stock raising district, or of two adjoining districs, of a qualified veterinary surgeon, who shall be subsidised by Government, and have an authorised scale of charges

to be made to the farmers for his services. The mover said that if there were more veterinary surgeons the farmers would avail themselves of their services.

Mr. Borthwick, C.V.S., said that at the present time they had a staff of sixteen veterinary surgeons. The country was not capable of carrying a large veterinary staff, and the idea occurred to him to get young students, who had been through their course at Elsenberg, and spreading them over the country, under the control of veterinary surgeons. These young men would not require a large salary, and if that scheme was adopted, it would be possible to relieve the veterinary surgeons considerably.

Mr. Heatlie considered that the Congress was asking much more than they could expect. They would all like veterinary surgeons close at hand, but the idea was not practicable. He asked Mr. Struben to withdraw his motion.

Mr. Van Aardt also favoured the withdrawal of the motion.

Mr. Douglass mentioned that this subject was fully thrashed out last year, and he moved, as an amendment, that the resolution then adopted be re-affirmed. The resolution was to the effect that Government be asked to appoint more veterinary surgeons in the country districts. He said he would add to his amendment that a scale of charges be arranged. It was pointed out that the veterinary surgeons were charging in some districts.

Mr. Borthwick said a trial in this direction had been made

Mr. Struben withdrew his motion in favour of the amendment, which was carried.

Tuberculosis in Cattle.

Mr. Jas. Rawbone moved the following resolution: "That in view of the fact that certificates, of freedom from tuberculosis, sent with cattle imported from abroad into this country have in several instances proved to be of no value, it shall be obligatory to have each animal so imported subjected to the tuberculin test, on landing, by the Government veterinary surgeons, without exception." The mover said that few of them recognised how much tuberculosis there was in the country. He mentioned several instances in which imported stock, on being subjected to the test, re-acted. This was such a serious matter that a deputation should go to the Government.

Mr. Myburgh seconded, suggesting the addition of a rider providing for quarantine.

Mr. Borthwick, C.V.S., said the regulations held that all cattle must be tested, unless accompanied by a certificate, when the veterinary surgeon had the option of testing the animals. He became suspicious of some Holland cattle, accompanied by a certificate, and found that the disease had been in existence some time. A similar experience resulted with some Scotch cattle. Arrangements had now been made for quarantining cattle for a month after arrival, for inspection. This was probably going to put importing back a good deal, and therefore he thought Gouvernment should come to the assistance of the owner by not charging for their maintenance in quarantine.

Mr. Heatlie asked if it was not a fact that in certain districts tuberculosis was prevalent, and was it not unwise to allow cattle to be moved from one district to another, He moved, as an addition to the motion, the words "And that the attention of the Government be drawn to the extreme danger of the spread of this disease from infected herds in the Colony."

Mr. Borthwick said tuberculosis was only prevalent in the Cape Peninsula, and surrounding districts. Of course, the eradication of the disease would have to be taken slowly.

Mr. Starke asked if an animal left the quarantine quite clear of the disease, would there be fear of its breaking out?

Mr. Borthwick said the tuberculin test was a pretty sure one.

Mr. P. Ryan said he had only that morning valued a cow that was only in the Colony nine months, and which arrived here with a clean certificate, but had had to be destroyed for tuberculosis. The owner of that cow was about £40 out of pocket on account of the outbreak.

Mr. Jack said the farmers themselves had the solution to the difficulty in their own hands, which was, not to buy bulls that had not been through the test.

Mr. Kohler asked for some information with regard to the danger to human beings of drinking milk from tubercular cattle.

Mr. Borthwick said it was recognised that human beings could contract tuberculosis from drinking the milk from tubercular cattle, more especially if the udder was affected. He had examined the dairy herds around Cape Town, and found them very clear from tuberculosis. He explained that in the Western Province cattle were housed, and the more warmth the stock had the more tuberculosis. In the Eastern Province, where the cattle were kraaled, there was little or no tuberculosis. In the Eastern Province some years ago they brought a lot of cattle from Madagascar, all of which were affected by tuberculosis, but, with the exception of an isolated case or two, there was none now.

The motion, with the riders, was agreed to.

The Wine Industry.

Mr. Louw (Stellenbosch) moved: "That the Bill to amend the Wine and Brandy Adulteration Act be re-introduced into the Legislature, and that beer, Kafir beer, and aerated waters be included in it; and that the Act be stringently enforced; further, that a prohibitive duty be imposed on imported vinegar, essence of vinegar, acetic acid, and glucose." He said his object in bringing forward such a motion was to look after the interests of the men of the East, and to see that what they got in the way of wine and vinegar was not adulterated. He read extracts from reports of anallysis showing that vinegar, at present retailed, was considerably adulterated.

After discussion, the motion was adopted.

Duty on Imported Liquor.

Mr. Louw moved, seconded by Mr. J. Starke: "That a higher duty be imposed on imported liquor."

After an animated discussion, the resolution was adopted.

It was also resolved that the resolution passed at the Port Elizabeth Congress in 1907 on the Viticultural Industry be re-affirmed. The resolution was as follows: "In view of the enormous importance of viticulture to a considerable area and to a very large proportion of the population of the Colony, this Congress submits to the consideration of the Government that the time has come when the development of this great national industry should receive sympathetic treatment on the part of the Legislature. Congress recognises that at present the production of wine exceeds 50,000 leaguers, representing in value £382,000 without Excise, and that the Government has £170,000 of public money invested in the industry with a view to its extension. Further, that the property value concerned with the viticultural industry exceeds two and a half millions sterling. Congress, therefore, submits that in view of these facts the existing restrictions need careful revision with the object of extending the consump-

tion of light Colonial wines under due limitations and control, as against imported liquors and many of the injurious spirituous compounds at present being secretly manufactured and consumed in the country.

The Excise.

Mr. Versfeld moved, seconded by Mr. Neethling: "That in the opinion of this Congress the Excise should be abolished." He said it was a most important question. There was no market for Colonial wine; if they had a market he would not be against the Excise.

Mr. Neethling said the wine industry was in such a condition that farmers were taking up their vines and going in for ostrich farming. But what was to become of the poor labourers, men who were depending on the wine farmer for a living.

Mr. Louw asked the ostrich farmers how they would like to be treated as the wine farmer was. Brandy and ostrich feathers were considered luxuries; but he had to sell a leaguer of brandy for £9; while £32 10s. was claimed by the Government as Excise before the consumer got the brandy for consumption.

Mr. Edmeades gave a description of Oudtshoorn at the time it was a wine-producing district. Cape Colony would never compete with the wine-exporting countries of Europe, and they must rely on local consumption as a market for their wines. He caused great amusement by describing the condition of a village when brandy was 2d. a bottle, and the conditions at present existing. The farmer could afford to give his hands a glass now and then. He could not do that now, so that the farm hands went to the village for his drink, and generally finished by being locked up.

Mr. Swart moved that the Excise remain as it is.

Mr. Hoole could not understand the situation. Brandy was a luxury, and as the consumer paid the tax, he did not see why the Excise should be reduced.

Mr. Struben suggested that the Excise should be modified, and he moved that a reduction be asked for.

Mr. Stephen said he did not see how the removal of the Excise would help the farmer.

After further discussion, the question was put to the vote. The amendment for a reduction of the Excise being put first, was declared lost, and the original motion carried. A division was called for, which resulted as under:—

For the repeal of the Excise: Messrs. Van der Merwe, Botha, Duckett, Versfeld, De Wet, Neethling, Heatlie, Jurgens, Richards, Le Sueur, P. H. Swart, J. Starke, Louw, Hugo, Joubert, Edmeades, Perold, De Villiers, J. Faure, Le Roux, Minnaar, Theunissen, Collett, Theron, Smit, and Myburgh (26).

Against: Messrs. Albertyn, Bayly, Clarke, McNally, Van Aardt, Blomerus, Hoole, Warren, Hill, Stephen, H. Swart, Geard, Estment, Rawbone, Struben, Stahl, Waldron, and Lee (17).

Congress then adjourned, and resumed at 8 p.m. for the

EVENING SITTING.

The fixing of dates for the 1909 shows again came up for consideration. After considerable discussion, it was decided that the draft list be accepted, subject to local modification where necessary.

Classification of Sheep for Shows.

The following committee was elected to deal with the question of the classification of sheep for shows: Messrs. Warren, Hoole, Van Aardt, Stephen, Albertyn, and Bayly.

PRESIDENTIAL ELECTION.

The Hon. P. W. Michau, Vice-President, took the chair while the election of officers proceeded.

On the motion of Mr. Malleson, it was unanimously agreed that Mr. C. G. Lee be re-elected President for the forthcoming year. The election was received with loud applause.

OFFICE-BEARERS.

The election of office-bearers for the forthcoming year was then proceeded with, and resulted as follows: Vice-Presidents, Colonel Stanford and the Hon. Mr. Michau, M.L.C.; Committee: Messrs. F C. Bayly, O. E. G. Evans, E. M. Warren, E. T. L. Edmeades, R. H. Struben, D. M. Hugo, T. T. Hoole, D. J. Albertyn, P. R. Malleson, A. W. Douglass, R. Watson, Jas. Starke, S. van Aardt, A. P. Everett, and D. J. de Wet.

Mr. Douglass moved that the following be added to the list of Honorary Vice-Presidents: The Hon. F. S. Malan, M.L.A., the Hon. John Daverin, M.L.C., Mr. T. P. Theron, M.L A., and Mr. J. A. Sieberhagen. Seconded by Mr. Bayly, and carried.

Mr. Lee, on resuming his seat, thanked the Congress for the great honour they had conferred on him. As they had chosen him, he was glad, because during the coming year they were going through great hardships, but they were going to bring the two great peoples together. He had to forego a good deal to take up the position, but when he did so, he was buoyed up with the fact that the delegates were also entering heartily into the matter. He concluded by again returning thanks.

The nomination of delegates to the Inter-Colonial Congress was left to the Executive.

It was resolved that the next Congress be held at Cape Town.

UNDESIRABLE SIRES.

Mr. Struben moved: "That the Government be urged to introduce legislation for the reduction of the great numbers of undesirable horse stallions throughout the Colony, and, further, that this Congress would suggest the imposition of a horse stallion licence, and the introduction of a system of subsidy on the lines of the 'King's Premium,' in force in England." Mr. Versfeld seconded.

Mr. Edmeades defended the sire at present in the country, and said that many farmers kept a pair of entires for their carts, and if these were taxed there would be a general outburst of indignation in the country.

Mr. Jack said that one reason for such poor stock was the fact that all sorts of mongrels were allowed to run on the veld with good stock. He also thought that entires should be emasculated at a much younger age than they were.

Mr. Heatlie inquired where they were going to get men to inspect the stock.

Mr. Van Aardt thought it was much better to leave the selection of sires to the farmer himself, than to send men round the country condemning stock. He considered the country was much too young for moving in the direction suggested by the resolution.

The matter was still under discussion when Congress adjourned to the next day.

THIRD DAY.—WEDNESDAY, JUNE 24.

The delegates having visited Elsenberg Agricultural College during the morning, Congress did not re-assemble until 2.15 p.m.

Colonel Stanford, in the absence of the President, was voted to the chair.

Discussion proceeded on the motion standing over from the previous evening on undesirable sires, which was adopted in the following form: "That the Government be urged to introduce legislation for the reduction of the great numbers of undesirable stallions throughout the Colony, and, further, that this Congress would suggest the introduction of a sysem of subsidy on the lines of the King's premium in force in England."

Classification of Sheep.

The Special Committee appointed to deal with the classification of sheep reported as follows: The committee wish to report that they are of strong opinion that the present classification of sheep classes at agricultural shows is detrimental to the best interests of the sheep industry, more especially in that it tends to the crossing of various distinct types of sheep, producing animals of no fixed type at all, but merely a show sheep. The committee recommend that the classification be arranged for future exhibitions under three classes, viz., for sheep.

1. Australian Tasmanian type.
2. Rambouillet type.
3. Vermont type.

The committee further recommend that all agricultural societies shall be immediately advised of Congress's resolution on this matter.

The report was adopted.

Tax on Greyhounds.

Mr. Bayly moved: "That Government be urged to introduce legislation to place a heavy tax on greyhounds for the purpose of protecting game." He referred to the great harm done to game by bands of natives accompanied by greyhounds and mongrels going through the country. Mr. Joubert seconded.

Mr. Waldron drew attention to the fact that coursing was just in its infancy in Cape Colony, and the imposition of such a tax would create a great set-back to this sport. He asked the mover of the resolution to include in his resolution an exemption for greyhounds, the property of members of recognised coursing clubs.

The President said a Bill dealing with this subject would come before Parliament during the coming session.

Mr. Heatlie contended that greyhounds were kept by members of coursing clubs as luxuries, and therefore should be paid for.

It was pointed out that already in many districts a tax of 5s. a dog had to be paid to the Divisional Councils.

Mr. Edmeades said there was legislation dealing with this matter already in force, and it should be enforced.

Mr. Struben said that if coursing clubs were exempted, then bands of coloured people would start coursing clubs all over the country.

Mr. Waldron pointed out that coursing clubs of coloured people would not be recognised by the S.A.K.C.

The matter having been debated at considerable length, it was agreed that Government be urged to introduce legislation to place a heavy special dog tax on greyhounds and bastard greyhounds for the purpose of protecting game, and that this special tax be collected by Government.

Game Protection.

Mr. Albertyn moved: "That all sporting guns and rifles owned by private individuals should be registered, and an annual licence of not less than 10s. per gun be imposed."

Mr. Versfeld suggested to alter the wording to read "everybody carrying a gun," because a man who paid his licence could lend it to anybody.

Mr. Douglass said the question of protecting game rested with the farmers themselves, and if they wanted to protect the game they could easily do so.

The motion was put as amended, and lost.

Greater Activity for Agricultural Societies.

The President (Mr. C. G. Lee), having taken the chair, moved the following resolution: "This Congress strongly urges upon all agricultural societies the advisability of considering the practicability of maintaining more active operations in the interests of agriculture during the annual periods between the holding of the annual show, and that the Executive during the ensuing year endeavour to assist societies in this object, as far as possible." He strongly urged the necessity of maintaining more active operations in the interests of agriculture in the periods between the holding of the annual shows, and instanced the good work that several local societies were doing, whilst with others the only work covered was the annual show.

Mr. Noble Jack said that what was required was information, and the only way to get that was from men who knew it. It was articles on different matters by men who were experts that educated the people.

Mr. Woodin said his society had already made a step in the direction mentioned. Secretaries of agricultural societies did not come sufficiently into touch with the farmers to know what they wanted, but when they got the information, they would be only too desirous to carry it on.

The motion was unanimously adopted.

Vagrants.

Mr. Bayly moved a resolution asking Government to amend the Vagrancy Laws so as to protect farmers against vagrants, who move about the country and refuse to work.

The motion was debated at length, but it was eventually agreed to refer the whole subject to the Executive for consideration and such action as may be found necessary.

The "Agricultural Journal."

Mr. Neethling moved: "That the *Agricultural Journal* be sent gratis to all members of agricultural societies who apply for same."

Mr. Joubert moved, seconded by Mr. Struben: "That the free circulation of the *Agricultural Journal* be abolished."

Both these motions having been negatived, it was resolved to instruct the Executive to arrange for a deputation to the Secretary for Agriculture to endeavour to get the vote for that publication increased.

Duty on Beer.

Mr. Heatlie moved: "That the Excise duty on Colonial beer be raised to the level of that in the neighbouring colonies, and that a higher Excise duty be levied on all beer manufactured from material other than malt." The motion was agreed to.

The Troops.

Mr. Waldron moved: "That in view of the contemplated redistribution of the South African garrison, Government be requested to approach the Imperial authorities and strongly urge the suitability for garrison purposes of the Cape Colony in general, and of the Cape Peninsula in particular."

Mr. Struben favoured the adoption of the resolution if the words "Cape Peninsula" were withdrawn. The motion as amended was carried.

The Work of the Agricultural Department.

Mr. Woodin moved the following resolution: "That Congress put on record its high appreciation of the services rendered by the Agricultural Department in its efforts to assist the agricultural industries of the Cape Colony. Further, that Congress appreciates to the fullest extent the absolute impartiality on the part of the Department in their efforts to assist the bringing about of closer union amongst agricultural bodies." Seconded by Mr. Fairweather, and carried.

Votes of Thanks.

Votes of thanks to the President and Executive of the City and Civil Service Clubs, to the Mayor and Corporation of Cape Town, to the Chief Traffic Manager, C.G.R., and General Manager, N.C.C.R., for concessions, Principal, Elsenberg College, the Minister of Agriculture, and the staff of the Agricultural Department were moved by the President, who also referred to the excellent work done by the Secretary, which, he said, left nothing to be desired.

The President, in closing the Congress, said the country would undoubtedly appreciate the work done by the delegates, and he had great hopes for the ultimate closer union scheme.

The proceedings then terminated.

ANIMAL DISEASES—CONTAGIOUS AND INFECTIOUS.

Summary of Outbreaks of Contagious and Infectious Animal Diseases Scheduled under Act No. 27 of 1893.

Still under Quarantine on 30th June, 1908.

District.	Anthrax.	Epizootic Lymphangitis.	Glanders.	Lungsickness.	Redwater.	Scabies (Equine.)	Sponsziekte.	Tuberculosis.	Totals.
Alexandria	...	...	...	...	...	...	4	...	4
Aliwal North	...	...	...	...	...	...	2	...	2
East London	1	1	...	7	...	...	7	...	16
Cape	...	...	...	...	...	...	...	1	1
Fort Beaufort	...	...	...	...	...	...	1	...	1
Gordonia	...	...	...	7	...	...	...	...	7
Hay	...	...	...	1	...	...	...	...	1
Herschel	...	...	...	...	...	...	2	...	2
Humansdorp	...	2	...	...	6	4	2	...	14
Kimberley	...	...	...	...	...	...	5	...	5
King William's Town	...	...	...	8	...	...	2	...	10
Komgha	...	...	...	5	...	...	1	...	6
Kuruman	1	...	...	...	...	...	...	...	1
Mafeking	...	...	...	...	...	...	1	...	1
Peddie	...	...	...	1	...	...	...	...	1
Queenstown	...	...	...	...	...	...	2	...	2
Stellenbosch	...	...	...	...	...	...	...	1	1
Native Territories.									
Tembuland.									
Elliotdale	...	...	...	1	...	...	1	...	2
Engcobo	...	...	...	21	...	...	...	...	21
Mqanduli	...	...	...	26	...	...	1	...	27
St. Mark's	1	...	1	3	17	...	12	...	34
Umtata	...	...	...	43	...	...	...	...	43
Transkei.									
Butterworth	...	...	...	9	...	...	...	...	9
Kentani	1	...	...	22	...	...	2	...	25
Nqamakwe	1	...	...	17	...	...	2	...	20
Tsomo	...	...	...	8	3	...	...	...	11
Willowvale	...	...	...	11	...	...	...	...	11
Pondoland.									
Libode	...	...	...	1	...	...	...	...	1
Lusikisiki	...	...	...	4	...	...	...	...	4
Ngqeleni	...	...	...	7	...	...	...	...	7
Flagstaff	...	...	...	1	...	...	...	...	1
Tabankulu	...	...	...	31	...	1	...	...	32
East Griqualand.									
Mount Ayliff	...	...	...	1	...	...	...	...	1
Mount Frere	...	...	...	12	...	...	...	...	12
Qumbu...	...	...	...	26	...	...	...	...	26
Tsolo	...	...	...	36	...	...	...	...	36
Umzimkulu	...	...	...	...	...	...	1	...	1
Totals	5	3	1	309	26	5	48	1	399

J. D. BORTHWICK, Chief Veterinary Surgeon.

Department of Agriculture,
Cape Town, 3rd August, 1908.

CAPE FRUIT IN THE TRANSVAAL.

CONDEMNED CONSIGNMENTS.

The following is a list of consignments of Cape Fruit condemned by the Plant Inspector, at Johannesburg, during the season, 1907-8:—

Dec. 11, '07, J. H. Malan, Wellington, 20 Boxes Pears, 25 per cent. Codling Moth. Destroyed.

Dec. 11, '07, K. Lala, Huguenot, 63 Boxes Pears, 7 per cent. Codling Moth. Destroyed.

Dec. 11, '07, Naidoo, Robertson, 2 Baskets Pears, 4 per cent. Codling Moth. Destroyed.

Jan. 4, '08, Cillie & Son, Wellington, 30 Boxes Pears, 5 per cent. Codling Moth. Reconsigned.

Jan. 6, '08, J. H. Postlethwaite, Bosman's Crossing, 29 Boxes Pears, 9 per cent. Codling Moth. Destroyed.

Jan. 13, '08, K. M. Naidoo, De Doorns, 9 Boxes Apples, 13 per cent. Codling Moth. Reconsigned.

Jan. 14, '08, S. Coetzias, Bosman's Crossing, 42 Boxes Pears, 12 per cent. Codling Moth. Reconsigned.

Jan. 14, '08, Black, De Doorns, 10 Baskets Pears, 5 per cent. Codling Moth. Reconsigned.

Jan. 14, '08, J. Sarenbock, Huguenot, 6 Boxes Pears, 12 per cent. Codling Moth. Reconsigned.

Jan. 22, '08, J. H Postlethwaite, Bosman's Crossing, 17 Cases Pears, 5 per cent. Codling Moth. Reconsigned.

Jan. 22, '08, Rhodes Fruit Farm, Drakenstein, 74 Cases Pears, 6 per cent. Codling Moth. Reconsigned.

Jan. 23, '08, J. Shapiro, Huguenot, 2 Boxes Pears, 5 per cent. Codling Moth. Destroyed.

Jan. 23, '08, Dimitri, Stellenbosch, 28 Boxes Pears, 4 per cent. Codling Moth. Reconsigned.

Jan. 25, '08, Nicholson, Stellenbosch, 10 Boxes Pears, 8 per cent. Codling Moth. Destroyed.

Jan. 25, '08, J. & H. Hards, Grahamstown, 5 Boxes Apples, over 5 per cent. Fusicladium. Reconsigned.

Jan. 27, '08, Breda, Stellenbosch, 40 Boxes Pears, 4 per cent. Codling Moth. Reconsigned.

Jan. 27, '08, J. & H. Hards, Grahamstown, 10 Boxes Apples, Fusicladium. Reconsigned

Jan. 27, '08, J. Minnaar, Worcester, 19 Baskets Apples, 5 per cent. Codling Moth. Reconsigned.

Jan. 27, '08, J. Minnaar, Worcester, 10 Baskets Pears, Codling Moth and Rotten. Destroyed.

Jan. 27, '08, Olivier Bros., 50 Boxes Pears, 9 per cent. Codling Moth. Reconsigned.

Jan. 27, '08, J. H. Postlethwaite, Bosman's Crossing, 104 Boxes Pears, 5 per cent. Codling Moth. Reconsigned.

Jan. 29, '08, Harris, Stellenbosch, 60 Boxes Pears, 4 per cent. Codling Moth. Reconsigned.

Feb. 1, '08, Rhodes Fruit Farm, Groot Drakenstein, 10 Cases Pears, 5 per cent. Codling Moth. Destroyed.

Feb. 6, '08, J. Brink, Touws River, 60 Boxes Pears, 5 per cent. Codling Moth. Reconsigned.

Feb. 8, '08, Woodland & Kirk, Wellington, 22 Boxes Pears 5 per cent. Codling Moth. Reconsigned.

Feb. 11, '08, J. H. Postlethwaite, Bosman's Crossing, 61 Boxes Pears, 5 per cent. Codling Moth. Reconsigned.

Feb. 11, '08, Nicholas, Stellenbosch, 5 Boxes Pears, being part of a consignment, over 6 per cent. Codling Moth. Destroyed.

Feb. 11, '08, J. H. Postlethwaite, Bosman's Crossing, 50 Boxes Pears, 3 per cent. Codling Moth. Reconsigned.

Feb. 14, '08, J. Cillie, Wellington, 20 Boxes Pears, 8 per cent. Codling Moth. Destroyed.

Feb. 17, '08, Dimitri, Stellenbosch, 105 Boxes Pears, 4 per cent. Codling Moth. Reconsigned.

Feb. 22, '08, Station Master, Naauwpoort, 53 Boxes Pears, 3 per cent. Codling Moth. Destroyed.

Feb. 25, '08, V. Naidoo, Worcester, 7 Baskets Apples, 14 per cent. Codling Moth. Reconsigned.

Feb. 25, '08, K. M. Naidoo, Robertson, 14 Baskets Pears, 11 per cent. Codling Moth. Reconsigned.

Feb. 25, '08, K. M. Naidoo, Robertson, 12 Cases Pears, 9 per cent. Codling Moth Reconsigned.

Feb. 26, '08, C. A. Visser, Robertson, 100 Cases Pears, 12 per cent. Codling Moth. Reconsigned.

Feb. 26, '08, D. Sadien, Wynberg, 8 Cases Apples, 8 per cent. Codling Moth. Destroyed.

Feb. 26, '08, M. T. Heyleger, Bosman's Crossing, 11 Cases Pears, 9 per cent. Codling Moth. Destroyed.

Feb. 29, '08, Brink, Somerset West, 114 Cases Pears, very bad with Codling Moth. Destroyed.

March 2, '08, A. Acar, Worcester, 14 Cases Pears, 5 per cent. Codling Moth. Reconsigned.

March 4, '08, Liebnuts, French Hoek, 13 Cases Pears, 50 per cent. Codling Moth. Destroyed.

March 5, '08, W. F. & Produce Supply, Huguenot, 25 Baskets Pears, 20 per cent. Codling Moth. Reconsigned.

March 6, '08, Naidoo & Company, Robertson, 7 Cases Pears, 10 per cent. Codling Moth. Reconsigned.

March 9, '08, High Constantia Estate, Wynberg, 24 Boxes Pears, 17 per cent. Codling Moth. Destroyed.

March 11, '08, W. de Boer, Worcester, 16 Boxes Pears, 5 per cent. Codling Moth. Reconsigned.

March 13, '08, High Constantia Estate, Wynberg, 24 Boxes Pears, 4 per cent. Codling Moth. Destroyed.

March 16, '08, V. Naidoo, De Wet, 8 Boxes Quinces, 5 per cent. Codling Moth. Reconsigned.

March 25, '08, J. Minnaar, Worcester, 5 Boxes Pears, over 5 per cent. Codling Moth. Destroyed.

March 25, '08, Botha & Co., Worcester, 14 Cases Pears, 7 per cent. Codling Moth. Reconsigned.

March 28, '08, J. Minnaar, Worcester, 12 Boxes Apples, over 5 per cent. Codling Moth. Destroyed.

March 30, '08, Black, De Doorns, 15 Baskets Pears, 5 per cent. Codling Moth. Reconsigned.

March 31, '08, K. M. Naidoo, Robertson, 10 Baskets Quinces, 7 per cent. Codling Moth. Reconsigned.

April 1, '08, K. M. Naidoo, Robertson, 6 Baskets Pears, 10 per cent. Fruit Fly. Reconsigned.

April 22, '08, Bapoo, Tulbagh, 31 Baskets Apples, 3 per cent. Codling Moth. Destroyed.

April 25, '08, Standard Cold Storage, Woodstock, 50 Boxes Apples, 3 per cent. Codling Moth. Destroyed.

April 25, '08, P. A. Black, De Doorns, 10 Baskets Pears, 28 per cent. Codling Moth. Destroyed.

April 27, '08, P. A. Black, De Docrns, 7 Baskets Pears, 28 per cent. Codling Moth. Destroyed.

April 28, '08, W. F. & Produce Supply, De Doorns, 15 Baskets Quinces, 15 per cent. Codling Moth. Destroyed.

April 28, '08, W. F. & Produce Supply, De Doorns, 9 Cases Apples, 5 per cent. Codling Moth. Destroyed.

April 28, '08, W. F. & Produce Supply, De Doorns, 20 Cases Pears, 5 per cent. Codling Moth. Reconsigned.

April 28, '08, Joubert, Ceres, 72 Cases Pears, and 18 Cases Apples, both consignments , over 3 per cent. Codling Moth. Reconsigned.

April 28, '08, J. de Mardt, Lyndock, 200 Cases Pears, 10 per cent. Codling Moth. 149 Cases sent to Delagoa Bay, and 51 were destroyed.

April 28, '08, J. de Mardt, Lyndock, 65 Cases Pears, 10 per cent. Codling Moth. 45 Cases were sent to Delagoa Bay, and 20 were destroyed.

May 5, '08, Burger, De Doorns, 25 Boxes Apples, 3 per cent. Codling Moth. Reconsigned.

May 19, '08, Joubert Ceres Road, 53 Boxes Apples, 3 per cent. Codling Moth. Destroyed.

June 2, '08, J. H. Comellach, Grahamstown, 1 Box Oranges, 24 per cent. Red Scale. Destroyed.

June 18, '08, J. Shapiro, Cape Town, 19 Cases Apples, Black Rot Fungus. Destroyed.

SUMMARY.

672	Packages Reconsigned	672
1,389	,, Destroyed	1,389
	Total...	2,061

WINE SHOW, 1908.

WESTERN PROVINCE BOARD OF HORTICULTURE.

ANALYSES OF PRIZE WINES AND BRANDIES.

SECTION A.—WHITE WINES.

Class.	No.	Description of Sample.	Prize.	Alcohol volume, %	Proof spirit %.	Extract, %	Sugar, %	Total acid as tartaric, %	Volatile acid as acetic, per mille.	Sulphurous oxide, milligrammes, per litre.
		Hock Type.								
I.	8	P. & P. Rabie ...	1st	13·52	23·70	1·852	...	·464	·447	89
	1	L. Clifford Brown ...	2nd	14·37	25·18	2·325	...	·536	·688	Nil
	4	Drostdy Co-operative Winery, Tulbagh...	3rd	13·15	23·04	2·167	...	·657	·452	64
II.		*Sauterne Type.*								
	27	P. & P. Rabie ...	1st	13·90	24·36	1·856	...	·487	·365	76
	19	L. Clifford Brown ...	2nd	13·71	24·03	2·078	...	·497	·516	Nil
	25	J. H. de Villiers ...	3rd	13·99	24·52	4·986	2·856	·566	·594	120
III.		*Sherry Type.*								
	36	E. Lange	1st	15·22	26·68	2·676	...	·464	·615	99
	39	Louw Bros.	2nd	13·49	23·64	2·455	...	·491	·686	147
	44	James Malan ...	3rd	16·32	28·63	2·715	...	·490	·568	Nil
IV.		*Sweetish White Wine (Madeira Type).*								
	46	G. A. Retief... ...	1st	13·16	23·05	8·95	6·41	·361	·472	36
	48	Drostdy Co-operative Winery, Tulbagh ...	2nd	12·55	21·99	14·15	11·43	·356	·788	Nil
V.		*Sweet White Wine.*								
	54	D. M. le Roux ...	1st	6·67	11·69	56·43	49·16	·654	·885	148
	52	P. and P. Rabie ...	2nd	14·47	25·35	27·72	22·68	·346	·167	Nil
VI.		*Stein.*								
	67	T. J. de Waal ...	1st	13·44	23·55	2·685	...	·634	·538	140
	66	James Malan ...	2nd	11·95	20·95	2·294	...	·572	·621	25
	55	E. Lange	3rd	14·58	25·54	2·663	...	·438	·600	102
VII.		*Green Grape.*								
	77	C. W. H. Kohler ...	1st	12·69	22·23	2·050	...	·464	·532	Nil
	75	J. H. de Villiers ...	2nd	13·16	23·05	2·371	...	·484	·527	96
	68	L. Clifford Brown ...	3rd	12·59	22·07	2·135	...	·539	·522	Nil
VIII.		*White French.*								
	84	P. & P. Rabie ...	1st	13·15	23·04	2·045	...	·575	·370	70
	82	Drostdy Co-operative Winery, Tulbagh...	2nd	12·68	22·22	2·283	...	·654	·428	64
IX.		*A.O.V. White Wine, unmixed.*								
	92	P. & P. Rabie ...	1st	13·15	23·04	2·023	...	·490	·469	50

WINE SHOW, 1908.—ANALYSES OF PRIZE WINES & BRANDIES—*contd.*

SECTION B.—RED WINES.

Class.	No.	Description of Sample.	Prize.	Alcohol volume, %.	Proof spirit %.	Extract, %.	Sugar, %.	Total acid as tartar'c, %.	Volatile acid as acetic, per mille.	Sulphurous oxide, milligrammes, per litre.
X.		*Claret.*								
	108	High Constantia Estate	1st	11·61	20·35	2·476	...	·629	·438	Nil
	105	Govt. Wine Farm, Constantia... ...	2nd	11·[illegible]4	20·04	2·271	...	·523	·433	Nil
	103	F. F. Versfeld ...	3rd	11·70	20·50	2·164	...	·497	·610	Nil
XI.		*Burgundy.*								
	127	Govt. Wine Farm, Constantia... ...	1st	13·43	23·54	2·692	...	·399	·501	Nil
	135	Louis Cloete... ...	2nd	12·68	22·22	2·391	...	·409	·558	Nil
	133	Henry Cloete ...	3rd	12·68	22·22	2·271	...	·543	·548	Nil
XII.		*Heavy Dry Red Wine (Port Type).*								
	140	P. & P. Rabie ...	1st	15·90	27·87	3·091	...	·556	·402	50
	141	Henry Cloete ...	2nd	14·00	24·54	2·927	...	·471	·840	Nil
XIII.		*Heavy Sweetish Red Wine (Sweet Port Type).*								
	147	T. & D. Hugo ...	1st	16·87	29·57	20·57	17·07	·494	·579	26
	149	D. M. le Roux ..	2nd	10·09	17·69	34·05	27·76	·477	·854	100
	145	Drostdy Co-operative Winery, Tulbagh...	3rd	12·81	22·45	18·88	15·79	·406	·881	60
XIV.		*Sweet Red Wine.*								
	156	P. & P. Rabie ...	1st	14·14	24·78	27·19	22·17	·394	·157	Nil
	154	T. & D. Hugo ...	2nd	16·86	29·53	20·65	16·84	·429	·574	25
	153	Louw Bros.	3rd	17·26	30·26	22·88	19·38	·674	·277	Nil
XV.		*Hermitage.*								
	164	Hohenort Estate ...	1st	11·52	20·19	2·215	..	·536	·365	Nil
	165	J. A. Brink	2nd	11·35	19·89	2·268	...	·491	·532	Nil
	167	F. F. Versfield ...	3rd	12·05	21·11	2·268	...	·477	·642	Nil
XVI.		*Cabernet de Sauvignon*								
	178	F. F. Versfeld ...	1st	11·79	20·65	2·606	...	·490	·579	Nil
	179	Govt. Wine Farm, Constantia... ...	2nd	13·34	23·37	2·675	...	·503	·522	Nil
	180	High Constantia Estate...	3rd	11·61	20·35	2·636	...	·759	·193	Nil
XVII.		*Pontac.*								
	182	G. A. Retief... ...	1st	19·28	33·79	5·063	...	·320	·772	Nil
	185	P. & P. Rabie ...	2nd	13·05	22·88	3·216	...	·452	·652	Nil
	184	Henry Cloete ...	3rd	13·05	22·88	3·470	...	·510	·766	Nil
XXIII.		*Light White Wine.* (Special Prize, Silver Cup.)								
	203	P. & P. Rabie ...	1st	13·86	24·29	1·842	...	·507	·381	30
XXIV.		*Light Red Wine,* (Special Prize, Jagger Cup.)								
	228	High Constantia Estate...	1st	12·62	22·12	2·254	...	·510	·406	Nil

WINE SHOW, 1908.—ANALYSES OF PRIZE WINES & BRANDIES—*contd.*

SECTION C.—BRANDIES.

Class.	No.	Description of Sample.	Prize.	Alcohol volume, %	Proof spirit, %	Extract.	In grammes, per 100 litres, absolute alcohol. Volatile acid.	Aldehyde.	Furfurol.	Ethers.	Higher alcohols.	Total secondary constituents.
19		*Wine Brandy.*										
	188	James Malan ...	1st	49·47	86·7	trace	144·0	33·8	·41	312·7	398	886·91
20		*Dop Brandy.*										
	189	G. A. Retief ...	1st	55·75	97·7	trace	35·8	56·3	·16	149·3	211	452·56
	192	D. M. le Roux ...	2nd	51·75	90·7	traoe	19·5	69·4	·47	261·1	328	678·47
	193	A. P. Burger ...	3rd	54·55	95·6	trace	128·5	59·1	·35	290·1	310	788·05

From the chemical point of view, these prize wines are the finest that have ever been analysed in the Government Analytical Laboratory.

J. LEWIS, M.A.

CORRESPONDENCE.

The Cape Horse.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—One of the best letters I have ever read on "The Cape Horse" was contributed to your Journal last month, signed "Griqua."

I can bear out almost everything he says from long experience, and the many thousands of miles travelled by me in execution of my duties in the Public Works Department during thirty-four years' service.

The only points that I cannot substantiate are:—(1) The statement that South Africa has been proved to be the only country in the world where the famous English thoroughbred retains his type without infusion of fresh blood every generation or so. This may be so or not, I do not know. (2) That an impression among the general public is growing that South African horse-breeders are only breeding racehorses, etc. I did not know of this.

With the exception of these points I should like to substantiate from actual experience the remainder of the remarks contained in this valuable letter, which can only have been written by a man of long experience, keen observation, and an unbiassed mind.

There is no doubt that the best stallion for the ordinary Cape mare is a compact thoroughbred with plenty of bone, and not less than eight inches below the knee (a spot where a good many of the Cape horses fail). A Queen's Premium horse is a pretty safe investment to go in for even if you have never seen him.

After the Thoroughbred undoubtedly comes the Arab—in this "Griqua" is again correct. The late Chas. Barry had one of the best. I believe he was, however, a Gulf Arab, but be this as it may his progeny proved an unqualified success in the districts of Robertson, Swellendam, and Caledon, where some descendants still remain, the war having been responsible for the disappearance of many others, as it was for very large numbers of the old Cape Horse—with his clean, flat legs, compact body, and good all round points. Many of the best specimens were to be seen in the old days running in the post-cart between Cape Town and Port Elizabeth doing their eight miles an hour throughout, often with 1,500 lbs. of mails behind them. Where are they now? Nearly all gone, and in their place a mixed breed from a dozen different countries, with the remnants of the old Cape horse here and there.

It is a pity to lose this old breed or get it mixed with foreign rubbish, and an effort should be made to perpetuate it by careful selection and the introduction of selected sires; I hope it will be done, notwithstanding the bad times.

Calvinia used to supply many of the best specimens of the Cape horse, known as a Hantam horse. The old farmers there paid very high prices for their stallions, £300 to £400, but no such sums, to my knowledge, have been spent on horses in that Division during the last twenty-five years. £30 to £40 is more like it, though the Van der Merwe's paid on two occasions £100 each for two sires, but I have not heard of other like sums being disbursed. The result is the Hantam horse has greatly deteriorated.

As an instance of the sort of stuff you got there, I may mention I bought a cream entire from Mr. Tini van Dyk, who always had the best. He was a cross-bred Arab. I worked this horse continually for fourteen years on long journeys, and then sold him for five pounds more than I gave for him (for an easy job). He is still fit and well, and won two competitions at Rosebank Show this year; he is now twenty-five years old. Such was the old Cape horse.

Hackneys, as my friend "Griqua" says—all men who love horses are friends—are all very well for town work, but too soft for travelling, where high action and "beef" are not required. They are, however, a most useful and showy breed for carriage and trap work.

For military purposes there cannot be two opinions about the old Cape horse. Not even with double teams could the Imperial Forces in the late War overtake the Boer Commandoes. The imported horses, of course, were not acclimatised—we will say this for them—but they proved their inferiority throughout in every respect, and died in thousands from exhaustion. The reputation of the old Cape horse for military work stood first in India, and officers used to come over regularly and buy here until the good times of diamonds and gold came, when they became too dear, and Australia, with her fiddle-headed, long-legged Walers, cut us out.

About racecourses. How are you to prove which is the best horse without having races? Are people going to breed Thoroughbreds to look at? And unless crossed they are of no use for anything else, and too expensive for anything (the best of them) but racing. The bad ones are of no use at all, not even to look at. It will be a dark day for horse breeders, farmers, and the community generally when horse racing is stopped, as it would if fox hunting was discontinued in England. By the way, there are two hundred and twenty-one packs of foxhounds in the United Kingdom. These packs comprise eight thousand couples of hounds, and they gave employment to one hundred thousand horses. These horses were valued at seven million pounds, and involved an outlay of *five million pounds for their keep* in 1899, and about the same at present.

As to farriers, they certainly should not be allowed to touch a horse's foot without having a certificate that they are qualified. The damage they do to horses in this country is incalculable, as detailed by "Griqua." I have never had a horse with corns, but the first thing the smith does is to cut out the frog as a rule, then hammer on a shoe without shaping it to the foot, and when nailed, rasp the foot down to the outlines of the shoe. I never allowed a knife to be put on the frog of any of my horses, but with all my care, it was done on several occasions—by a new man being put on where I had my horses shod—and I either did not send my driver or go myself. It took two years for the frog to grow again, and then never was as good as before. So the damage done by this ignorant smith was not only extremely annoying, but greatly damaged my horse.

I never had a lame horse except from accident (treading on something sharp, and on two occasions from rheumatism). I never had a sprained or lame shoulder, and kept from two to five horses for over thirty years, and travelled at one time eight months in the year at an average pace of six miles per hour, and forty per day, when travelling, and never stayed in the veld once on account of a sick horse.

For long distance travelling, a nice quiet hack, a good ride for a lady, or a quiet mount to shoot off, where can you equal the old Cape horse? May he long live is the wish of

R. Bromley,
Late Divisional Engineer, Public Works Dept.

Worcester, July 24.

The Divining Rod Proves a Success.

To the Editor, Agricultural Journal.

Sir,—With much interest I have read various letters which have appeared from time to time in the pages of your valuable *Journal*, both in favour of and against the Divining Rod.

Being on the point of sinking a couple of boreholes, I got the opinion of various persons as to the best course to obtain subterranean water. Some three years ago I had a borehole put down of 111 feet by the Star Jumper drill, and this hole was placed entirely upon the surrounding formation having plenty of local drainage and a good dyke. The hole seemed fairly good according to the boiler test, "which method is a fraud." It gave, according to the test, 1,000 gallons per hour. But after me going to the trouble and expense of erecting a large plant, which cost me about £75, I found the supply actually to be 75 gallons per hour. So this time I decided to give the Divining Rod a trial, with the result that two holes were completed at 133 feet.

The first hole, 72 feet deep, struck water at 29 feet 6 inches, yielding a supply of 900 gallons per hour, 21,600 per 24 hours. Water fresh. The second hole, 61 feet deep, struck water at 39 feet, yielding a supply of 1,000 gallons per hour, or 24,000 per 24 hours. Water slightly mineralised. Both of these holes were tested for eight hours with 5-inch cylinder, 3-inch pipe, 12-inch stroke. These two holes were divined by a Mr. Thomas Watson, Palmietfontein, P.O. Middlewater. This gentleman has already succeeded in gaining about 6 to 8 holes placed upon his sites, and not one hole is giving under 500 gallons per hour. I believe in the Divining Rod, provided it is worked by a conscientious man, which Mr. Watson is.—Yours, etc.,

J. G. Webster.

Waylands, Ann's Villa, July 6.

Melilot and Pea Clover.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Mr. Harrison's account appearing in the June issue was very interesting, showing how this pea clover has changed poor sandy soils into good loam.

I have just received a sample from a Sydney seedsman, who writes: "It is nearly related to Bokhara clover, and has the same strong smell and deep rooting habits. It is a wonderfully successful fodder plant on the sandy coasts of King Island, where it grows most luxuriantly. It has been identified by Mr. Maiden, Government Botanist, as Hexham Scent, a well known weed in N.S.W., and a particularly bad one in wheat paddocks, where it takes possession and taints the flour made from the wheat grown near it. It could, however, be used to advantage in poor, sandy country near the sea."—Yours, etc.,

E. R. McILWRAITH.

Port Elizabeth, July 11.

To the Editor, AGRICULTURAL JOURNAL.

Sir,—In the June No. appeared a letter from a N.S.W. friend, under the heading of Melilot or Pea Clover. I wonder whether it is the same kind of grass called differently in different countries, as in Natal, and also in Graham's Town, Melilot is botanically known as *Melilotus palviflora*. [The latter is what we know as "Stinkklaver," and is different to the *Melilotus officinalis*.—Ed.]

To this (the Palviflora) I drew the Department's attention in the beginning of 1908, and it was probably of too little significance to take it up and introduce it in Cape Colony. Readers can, however, be sure that on sour veld we cannot go much wrong by sowing it pretty freely as well for pasture as to cut for hay. Seed can be obtained from the Natal Government. The seed is imported from Australia, where it is considered one of the most profitable clovers under cultivation. In Natal it is doing very well, and in this Colony, where tried, it is well worth taking notice of.—Yours, etc.,

R. P. MALAN.

Porterville, July 27, 1908.

Wireworm in Sheep.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In your *Journal* for June there appears a letter from Mr. G. W. Brown, complaining of the loss of a number of sheep through being dosed with bluestone.

I can sympathise with Mr. Brown, as I have experienced the same loss more than once, and I also agree with Mr. Brown that the treatment does not kill all the worms.

But what I would like more especially to deal with is your footnote. You state these fatalities do occur at *odd* intervals; allow me to say they occur at *very frequent* intervals, though all losses may not be reported to the *Journal*.

Further on you state the treatment (bluestone) must stand until something better can be substituted. That, sir, is just the point: have we nothing more effective than bluestone, and at the same time a perfectly safe dose? I think we have, and that is the mixture known as "Bert Bowker's Cure," which is advertised on page xxxiii. of the *Journal*.

I, unfortunately, lost hundreds of sheep during the year 1907 from wire-worm, notwithstanding the fact that as soon as I found my sheep were affected with wire-worm I started dosing with bluestone, and kept it up for a period of nearly twelve months. I failed, however, to get rid of the wire-worm, and, what was more, found that this constant dosing with bluestone was undermining the constitution of the sheep.

About the end of 1907 my attention was drawn to "Bert Bowker's Cure." I obtained a small quantity, and was so pleased with the result, that I got sufficient for all my sheep. Since using this cure I have practically eradicated wire-worm, and my sheep are better this season than they have been for the past three years.

To prove this, I may state that during 1907 I had not a single sheep fit for the market, but during the last few months my sheep have been amongst th ebest on the local stock fairs, and this I attribute solely to having got rid of wire-worm, and in this instance it was done with "Bert Bowker's Cure."

It is needless for me to add I have no interest whatever in the "Cure," and I am giving my experience solely in the interests of my brother farmers. In this district I do not know of a single farmer who still uses bluestone for wire-worm—that is a thing of the past.—Yours, etc.,

A. WELSH.

Fort Beaufort, July 1, 1908.

[We have no knowledge of the composition of the remedy mentioned, therefore cannot say anything about it. If it is as effective as our correspondent believes, it is a great advantage.]

The Stewart Sheep Shearing Machine.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I see in your May issue a letter from Mr. C. W. Webster, *re* a "Stewart" shearing machine which he failed to work to his satisfaction, and asking to hear from any of your readers who have used this machine.

I used a Stewart machine for the first time last season, and although not an experienced shearer, found it work well. At first I was not very successful, but I found out, almost at once, that my fault was in not paying enough attention to the tension-screw on the shear-head. The tension-screw needs constant care and adjusting whilst shearing (but it only needs a touch to put it right); then I proceeded very satisfactorily, shearing 7, 8, and then 9 sheep in an hour. The noise is unavoidable, but I did not find it trouble me.

Of course, "500 sheep a day," taking a day at 10 working hours, must have been a misstatement on the agent's part. A merino or Shropshire shorn every 1·2 minutes would appear "too good to be true"; but I am quite satisfied to shear from 60 to 90 sheep a day with my "Stewart," as it shears uniformly, and cuts are entirely done away with, not to speak of the increased amount of wool obtained, which I put down at ¾ lb. per sheep.

I do not quite understand if Mr. Webster left kafirs to use the machine; if so, his non-success is easily understood, as I do not think they are intelligent enough to work it.

But I am sure Mr. Webster will alter his opinion if he gives the machine his personal attention, and sees the tension is right.

I have shorn both merino and cross-breds with my machine, and have two raw kafirs to assist me, one "turning the machine" and one "catching."—Yours, etc.,

W. TREVOR.

Ashmole Dales, Haenertsburg, July 3.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I was glad to see a letter from Mr. C. W. Webster in your May number, *re* his experiences with a Stewart shearing machine. I also bought one from an agent of the firm, who was travelling through our district, for £12, with a grinder. This purchase I consider about the worst I ever made. The agent also told me the same yarn that he told Mr. Webster, as to the number of stock the machine could shear in a day. He said that the machine only required a small youngster to turn it all day for the shearing, and a man to hold the cutter and the animal to be shorn. He even went so far as to say that a third man would be better still, as then there would be no delay in waiting for the animal to be shorn, thus emphasising the speed with which the machine shears. I found it would not do the work guaranteed by the agent, so wrote the firm telling them I would return it, as it cut the animals and turned very heavily. They refused, adding that my assertion was simply absurd. The agent told me repeatedly that the machine could not possibly cut the animal, and that you could shear some thousands with one knife, whereas after about the eighth or ninth animal the knife got so blunt that the *youngster* turning gets a rough time of it. The agent, who seemed to have "the gift of the gab," also told me that it shears goats much better than sheep. I tried it on both, and managed sheep better than goats, but the turning is heavy work, and the knives get blunt quickly, notwithstanding the quantity of oil used.

I don't know of one farmer in the District of Aberdeen who is satisfied with the machine, and a good many bought one. The firm gave a demonstration in the district, so they chose Klipplaat as the place for the purpose. I can't understand why they chose a place so far from Aberdeen. The result was that a lot of farmers who would have liked to see the demonstration were unable to attend. The demonstration consisted in shearing one goat (not a very heavy one) and the belly of another. An ex-

pert was brought down from Cradock, I think. When told that that was not a demonstration, and that thirty goats ought to be shorn at least, the reply was that they had not come down to shear all the goats of the Karroo.

As regards the grinder; after following the instructions carefully I could not get the knife or comb sharp at any price. As yet I have not had any benefit out of the machine. I got so disgusted with the thing that I packed it away in the boxes it came in, to get it out of my sight. I would also like to hear the results of your readers having tried the machine.—Thanking you for the insertion of this letter in your valuable *Journal*, yours, etc.,

ARTHUR ROBERTS.

Kruidfontein, Aberdeen, July 12.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—With reference to Alexander and Co.'s letter, in reply to a letter I wrote on sheep shearing by machinery, they say they do not guarantee their machine to shear 500 per day. As I said before, I told their agent that I would be well satisfied if the machine did half that number, which I thought more feasible; but since seeing the machine, I do not see any possibility of doing more than seventy or eighty with a native shearer working a machine. And then it has to be remembered that two men are at work. When I wrote and told Messrs. Alexander and Co. I would send the machine back, as it would not do the work it was guaranteed to do, they informed me that their agent made a mistake in guaranteeing 500 per day, but it would do 150. That is one hundred and fifty in a working day of eight hours. But now they go further, and say that a native with one season's practice will shear 150 per day. Has that been done and where? I wrote and asked them if it had been done, but they ignored that part of my letter. I am prepared to challenge Messrs. Alexander and Co. Will they come and shear 150 sheep for me in March? Messrs. Alexander and Co.'s representative, who wrote the letter, may come and turn the handle, and see for himself that it does not run as light and noiseless as a sewing machine, and he may set his native to practice at once. Should 150 be attained in one day I will pay £10 down. The grinder is not mentioned in the directions I received with the machine, in fact nothing is said about sharpening combs and cutters. Very little information is given on the cards of directions sent with the machine. On the card it says: "For further information, address Chicago Flexible Shaft Co., Chicago." That would be very satisfactory to start work and find out something is required, and patiently wait for a reply from Chicago. It sounds rather good, a machine making sheep produce more wool. If a sheep is shorn by hand, and then a machine is used, I do not doubt it will give more wool. But, let it be shorn again the following season by a machine, it will give no more than formerly. In my letter I did not condemn large shearing plants, but clearly stated that I do not see the advantage of farmers getting machines to work themselves. And I still hold to that statement. I noticed in last month's *Agricultural Journal* that Mr. J. Fred. Pentz had the same experience as myself, and he also condemns the hand-power machines.—Yours, etc.,

C. W. WEBSTER.

Basson's Kloof, July 21.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Messrs. Alexander and Co., in their letter endeavouring to establish the efficiency of their shearing machine, wind up by telling us that "men who laid down as much as £1,000 to erect their plant" find it a success. This is not the point, no one doubts the excellency of the work done by large plants on big sheep runs. It is the small hand shearer that is under discussion.

I don't think Mr. Webster gave any one to understand that he thought he would "influence these highly-trained men to sell out their plants,". though, if he thinks as I do, he will think that Messrs. Alexander and Co. must consider respect for their firm of small value when they try and enforce their arguments by a cheap and rather offensive sarcasm. Two years ago, at the advice of an Australian who had spent his life in wool sheds, and who was a strong advocate of machine and hand shearing, I bought a hand machine (though not a Stewart) and a patent grinder. Although this Australian had shorn his thousands, and kept his combs and cutters sharp with a large plant, he could not keep the combs and cutters of this hand machine sharp. We did all we could, and the agent from whom I bought the machine sent me free a new pattern of grinding machine. We followed all directions, but could do no good. Our best day was 50, and hard work and long hours at that. Eventually I gave it over. I discussed these machines with another Australian shearer, who, by the way, I saw demonstrating shearing at one of the meetings of Mr Moor, of Huddersfield, when he was giving lectures on wool. This man also told me he had no use for these small

hand machines. Last year I lent my machine to a neighbour who has a mechanical bump, and though he has the name for getting the maximum amount of work from the implements which he uses, he soon gave up the shearer. He could not make the combs and cutters sharp enough to finish a sheep, and, to say the best of it, the wool was dragged rather than cut off. Anyone wishing to try a hand shearer can have mine, with grinder, in perfect order, for one-third of the original cost. Won't some genuine user of the machine give it a good word?—Yours faithfully,

K. COWPER JOHNSON.

Westminster, O.R.C., July 21.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I have one of Stewart's shearing machines, with patent grinding attachment and a lot of spare cutters and combs. I also made a shearing table similar to the one used by the Mexican shearer in the booklet. I have long since broken up the table, and I grudge the space occupied in my store-room by the machine for the last four or five years.—Yours, etc.,

A. ROBINSON.

Good Hope, District Kimberley.

The Height of Fencing.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In reference to Kendrew's query whether a four feet fence is high enough, that depends on what he is farming with. If any ostriches, decidedly not. Otherwise he might make a tolerably good fence by having the two top wires barbed, the others plain, or all barbed and well laced. What I would term a stock-proof fence, including ostriches, is 8 wires, placed at 3, 9, 15, 21, 28, 37, 47, and 57 inches, all plain galvanised wire; first five Resiteel, then Nos. 8, 7, and 6 top, for lacing iron wire slack (I always use No. 12), 2 feet apart; to save lacing wire from a post, the first lace up to the 6th second to the 7th third to catch the top wire with a loop; same way down again to the 6th, then up again. Where the wire lifts from the ground fasten it down with a wire fastened round a stone, and planted in under a lace. For cattle and horses the three top wires barbed is decidedly preferable, but then the birds. As to posts, there is a great deal of difference in opinion about the distance apart; 20 yards, with one picket, or two is better for pickets, 15 feet deal, one deep and one flat cut, sawn in three lengths. Then saw your pieces to have them 2½ inches at the bottom and 1¾ inches on top; coal-tar them, and they will stand longer than your poles.

If they could keep the baboons and other bipeds out with a fence, I would support a vermin-proof one, but I would like to see it done. At gates have two long poles: hitch them together on top with a double wire, twisted tight.

I see in your notes that the Field Trial Committee of the Cradock Agricultural Society have given £50 in prizes on Dam-making Implements. A valuable addition to it would have been an essay on the best construction to keep silt out of a dam, as it is an undisputed fact that as soon as the bed of a dam has about a two feet layer of silt in it, it won't hold water.

J. W. VAN ZYL.

Tzamenkomst, Colesberg.

Can any of your readers inform me at which plantation I can get little trees—Algerian Ash.

Field Mice and Porcupines.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Could you or any of the readers of the *Journal* tell me the best way to destroy mice (those with the two stripes on their back)? They have destroyed a [illegible]. Also if there is no way of [illegible] after they have had a few [illegible]

J. J. BOTHA.

Mooifontein, Kokstad, July 12.

A Sheep Breeding Question Answered.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In your July number is a letter from a Mr. G. C. Snyman, re putting rams to ewes "shorn." The general practice here is to shear rams about the beginning of September, and put to ewes 1st October. Two rams to 100 ewes. I don't think it makes much difference if ewes are shorn or not, allowing they are in season. If the rams tup from start, after say two weeks add another ram to every 100 ewes. I am surprised that Mr. Snyman got any lambs at all by the number of rams he put to his ewes.—Yours, etc.,

JAMES S. PARKER.

Bok Poort, Beaufort West, July 27.

Wanted: Spekboom Slips.

To the Editor, AGRICULTURAL JOURNAL.

Sir,—Could any of your readers inform me where I can obtain slips, for planting, of the "Spekboom." I should like to receive the desired information as soon as possible, so as to plant a few slips some time in August.—Yours, etc.,

W. C. MUSTO.

Kalk Vaal, Krom River Siding, July 27, 1908.

[Will anyone who can supply the slips please communicate with Mr. Musto direct.—ED., "Agricultural Journal."]

How to Use the Divining Rod.

To the Editor, AGRICULTURAL JOURNAL.

Sir,—In reply to the question asked in the July number of the "Agricultural Journal," *re* Divining Rod. I have used it, and found it very valuable in finding water. The Divining Rod itself is a V-shaped twig, cut from a willow or tollbush. The size of the rod should be about a foot long. The rod should be held in both hands, erect, with the fingers round the ends. The thumb should be held under each point. The rod should be held as tight as possible, and not allowed to slip through the fingers.

Follow these directions, and then you will prove for yourself the truth and value of the Divining Rod.—Yours, etc.,

A. W. P. ANDERSON.

Faber's Kraal, Highlands, Cape Colony.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In reply to Mr. G. D. Benekes' enquiries *re* Divining Rod, I have had some experience, and would suggest that any kind of green wood is suitable, such as willow, quince, or apple, although I myself prefer the latter kind. The length of the rod—which should be V-shaped—may be anything from 18 inches to 2 feet, and held level, or with the point slightly raised in both hands, palms upwards, and thumbs along or around the wood.—Yours, etc.,

T. WATSON.

Palmietfontein, Somerset East.

NOTES ON THE WEATHER OF JUNE, 1908.

By THOMAS W. REES, B.A., LL.M., Assistant Secretary to the Meteorological Commission.

Unusually high mean pressure, a mean temperature only very slightly below the normal, a mean cloudiness considerably above the average, few thunderstorms, a mean depth of rainfall, a good deal more than usual, a great number of frosts—though few of great severity, slight local falls of sleet and snow, were the leading features of the weather of June.

DIVISION.	Mean Rainfall (1908).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	7·95	13	5·84	13	+2·11	+ 36
South-West ...	4·64	10	3·48	8	+1·16	+ 33
West Coast ...	1·15	6	1·44	6	—0·29	— 20
South Coast ...	4·75	7	2·18	6	+2·57	+118
Southern Karoo ...	2·09	4	0·90	3	+1·19	+132
West Central Karoo ...	0·54	3	0·54	2	0·00	...
East Central Karoo ...	0·75	3	0·42	2	+0·33	+ 79
Northern Karoo ...	0·35	2	0·62	2	—0·27	— 44
Northern Border ...	0·05	...	0·42	1	—0·37	— 88
South-East ...	1·94	5	1·03	3	+0·91	+ 88
North-East ...	1·10	3	0·88	3	+0·22	+ 25
Kaffraria ...	0·87	4	0·79	2	+0·08	+ 10
Basutoland ...	1·33	4	0·98	2	+0·35	+ 36
Orange River Colony...	...	...	0·70	2	...	...
Durban (Natal)	0·52	3	0·94	...	—0·42	— 45
Bechuanaland ...	0·05	1	0·39	1	—0·34	— 87
Rhodesia ...	0·00	0	0·14	1	—0·14	—100

Precipitation.—The mean rainfall, as shown by the records from 346 stations, was 2·36 inches, falling on 5 days, being 0·86 in., or 57 per cent., above the average. On examining the divisional rainfall, as shown by the accompanying table, it will be seen that it was generally above the average in the Colony proper, ranging from 132 per cent. over the Southern Karroo to 25 per cent. over the North-East. There was a deficiency, however, of 20 per cent. along the West Coast, 44 per cent. over the Northern Karroo, and 88 per cent. in the Northern Border. In addition to these there was a deficiency of 45 per cent. in Natal (as represented by Durban), 87 per cent. over Bechuanaland, and an absolute drought in Rhodesia. This is, however, a vast improvement on the amount of rainfall for both last month and for the corresponding month last year. Last month there was a deficiency over the whole of the Colony, Kaffraria, Basutoland, Bechuanaland, and Rhodesia, ranging from 100 per cent. over

Bechuanaland to 15 per cent. over the East Central Karroo. Matters were not much better in June, 1907, for there was then a deficiency over the whole of the Colony, as well as the before-mentioned places, with the sole exception of Rhodesia, varying from 100 per cent. in the Orange River Colony and Bechuanaland to 10 per cent. over the Southern Karroo. In the case of Rhodesia the increase was 29 per cent. Analysing the returns from the 346 stations, it is found that 28 had no rainfall; 54 had 0·01—0·50 in.; 65 had 0·51—1 in.; 85 had 1·01—2 ins.; 37 had 2·01—3 ins.; 10 had 3·01—4 ins.; 14 had 4·01—5 ins.; 19 had 5·01—6 ins.; 8 had 6·01—7 ins.; 6 had 7·01—4 ins.; 2 had 8·01—9 ins.; 6 had 9·01—10 ins.; 1 had 10·01—11 ins.; 6 had 11·01—12 ins.; leaving five stations with more than 12 inches. These were all in the Cape Peninsula with the exception of Woodifield, in the Division of George. The amounts over 12 inches recorded were as follows: St. Michael's, 15·37 ins.; Waai Kopje, 13·80 ins.; Bishopscourt, 13·33 ins.; Woodifield (George), 12·38 ins., and Kasteel's Port, 12·11 ins.

The intensity of fall was, therefore, in many instances, very heavy. From George it is reported that "on Sunday afternoon South-East rains set in, and have fallen in torrents unceasingly since (*i.e.*, from 14th to 16th), the rainfall for the 24 hours ending 8 a.m. on the 15th being 7·39 inches. This is a quarter of an inch more than that recorded in September, 1905, when the tower of the Dutch Reform Church collapsed. The roads are flooded, and swollen streams have stopped the traffic between here, Knysna, and Oudtshoorn. A good many lengths of rails have been washed away, and several river bridges are under water."

Thunderstorms were reported from 114 stations on 14 days, of which 78 occurred on the 21st and 22nd. *Hail* was noted at 16 stations on 5 days, principally on the 22nd. *Snow* fell at 7 stations on 5 days, viz., Zwartberg Pass, Waverley (Queen's Town), Hartebeestefontein (Steynsburg), Cata (King William's Town), Glencairn (Cathcart), Hogsback (Victoria East), and Barkly East. At Zwartberg Pass the ground was wholly covered, and at Hartebeestefontein there was half an inch on the 18th. *Sleet* occurred at 11 stations on 8 days.

Temperature, Cloud, and Wind.—The mean temperature of all the stations (52·5°) was only 0·1° cooler than usual, this being 5·6° less than last month, but only 0·2° colder than the corresponding month last year. The mean day temperatures (63·4°) were 0·7° lower, but the mean night temperatures (41·6°) were 0·7° higher than the normal, thus reducing the mean daily range to 21·8°—exactly the same as in June last year. The mean warmest station was Port St. John's, with a temperature of 60·3°, and the mean coldest Hanover, with 41·1°, a difference of 19·2°. This, too, curiously enough, is the same as in June last year. The highest mean maximum was 73·1° at Hope Fountain, and the lowest mean minimum 25·5° at Hanover. The warmest days were those of the 7th, 8th, and 9th. Minimum temperatures were most numerously recorded on the 10th, 11th, and 19th. The mean of the highest readings was 75·8°, this being 7·7° less than last month, but exactly 1·0° higher than in the same month last year. The mean of the lowest readings was 33·7°, being 3·9° less than in May last, and 0·3° more than in June, 1907. The absolute maximum for the month was 89·0°, at Port Nolloth on the 7th, and the absolute minimum 18·0°, at Aliwal North on the 19th, thus giving an extreme monthly range of the enormous amount of 71·0°, which is 8° more than in the same month last year. *Frosts* were of daily occurrence, 600 instances being reported during the month. These were evenly distributed. No reports of any very severe frosts have been received, and it must therefore be presumed that, though numerous, they were less severe than is usually the case during June. The mean amount of *Cloud* was 39 per cent., being 5 per cent. more than the previous month, and 1 per cent. more than in the same month last year. The amount of sky obscured was above the average over the Cape Peninsula, South-West, West Coast, South Coast, and Southern Karroo, but below the average over Northern Karroo, Northern Border, South-East, North-East, and Kaffraria. The cloudiest station was Disa Head (Table Mountain), with 67 per cent., closely followed by Cape Point, with 66 per cent., and Port St. John's, with 61 per cent. The clearest skies were experienced at Hope Fountain, with 7 per cent., Queen's Town, with 14 per cent., and King William's Town, with 17 per cent. The number of *Fogs* reported was considerably in excess of those noted during May, 145 instances occurring on every day of the month with the sole exception of the 11th. The prevailing morning *Winds* along the Coast were South-Easterly at Port Nolloth, North-Easterly at Dassen Island, South-Easterly at Cape Point, North-Westerly at Danger Point, Westerly at Cape Agulhas, Northerly at Mossel Bay, Westerly at Cape St. Francis, North-Westerly at Port Elizabeth and East London, and Westerly at Port St. John's and Durban. Inland the wind direction was again very variable, being South-Easterly at Kenhardt and Kimberley, Northerly at Murraysburg, North-Westerly at Aliwal North, Bedford, Cathcart, Lovedale, Westerly at Queen's Town, and South-Westerly at Kokstad. The mean *Wind-force* on the Beaufort Scale (0—12) was 1·88, corresponding to a mean velocity of 12·4 miles per hour, this being 2·3 miles more than last month, and 1·8 miles more than in June last year. The mean wind velocity was greatest over the South Coast, where it was 2·48, or 15·9 miles per hour, and least over the North-East, where it was only

0·86, or 6·9 miles per hour. *Gales* were reported as occurring at 45 stations on 19 days, particularly on the 6th and 7th. Some of these were very severe. About 10 p.m. on the 6th at George a terrific gale set in from the North-West, and continued with unabated force until next morning. Great damage was done to property. Several flagstaffs were blown down, and a number of iron buildings wrecked. During the height of the gale Mr. Nobbs' house was partly wrecked. The greater part of the three-sided balcony was demolished, and part of the roof carried away. *Hot Winds* were noted at 3 stations on 3 days, and *Duststorms* at 4 stations on 4 days. *Shocks of Earthquake* were felt at Hopetown at 12.10 a.m. on the 11th; at Insikeni on the 12th; and at Kokstad at 10.15 p.m. on the 15th; again at 10.54 on the 18th, at 3.50 p.m. on the 27th, and at 10.50 a.m. on the 29th.

OBSERVERS' NOTES.

VRUCHTBAAR (Wellington).—An excellent rainfall, well distributed over the whole month. Farmers have nothing to complain of except low prices for farm produce. Good crops of citrus fruits all over this district, but prices lower than the last 12 or 15 years.

KERSEFONTEIN (Piquetberg).—A most disappointing month—opening well, but latterly just high winds with a high glass.

SUNNYSIDE (Uitenhage).—Ploughing to great extent this season. Several cases of 3 days' sickness amongst cattle; no deaths.

PRINCE ALBERT.—Winter very mild up to the present.

KARREE KLOOF (Hopetown).—No rain, country very dry.

ALEXANDRIA.—Young crops healthy and promising. No prevalent disease.

HUXLEY FARM (Stutterheim).—The weather for this month has been most extraordinary. Such a rainfall (1·62 ins.) has not been known to fall here for the last 15 years. Winter will be mild, and every prospect of an early spring.

LAURISTON (Barkly East).—This month has been simply perfect. No wind or frosty nights, clear days. Stock fat, and plenty of grass.

SUNNYMEADE (Albert).—Since the rain on the 21st, we have had lovely weather. Sharp frosts every night. Stock still holding out.

THIBET PARK (Queen's Town).—Very severe frosts during the month.

KOKSTAD.—Country dry and parched. Severe frosts almost every morning, occasionally heavy mists.

KOKSTAD (The Willows).—The usual frequent frosts have occurred this month. Three shocks of earthquake have been felt. A trifle more than quarter of an inch of rain fell.

CARNARVON FARM.—This seems to be a year of records, and this June is no exception, as will be seen from the tabulated statement subjoined hereto. The rainfall on the 22nd instant—one inch—accompanied a succession of violent thunderstorms, starting at 10.10 p.m., and continuing till 4.30 a.m. The number of *Windy Days* during the month is the highest for the last eight years, as is also the case with the number of *Frosts* recorded (twenty-six). The number of *Cloudless Days* also constitutes a record for the period 1901-1908. Although the number of frosts has been many, the intensity has not been great. Ploughing is being carried on extensively, and, on the whole, prospects, as far as cereals are concerned, are good. Stock is in good condition. Ostrich farming has obtained a footing in this district, one gentleman having purchased over 100 birds. To them cold seems a secondary consideration, so long as they are allowed to wallow in lucerne and are kept fat.

	Rain.	Wind.	Frosts.	Cloudless Days.
1901	0·66	16	23	4
1902	2·14	14	24	9
1903	0·36	16	21	7
1904	0·10	12	21	4
1905	0·56	14	16	0
1906	0·61	12	19	6
1907	0·11	18	19	6
1908	1·08	17	26	8

TEMPERATURE—JUNE, 1908.

STATIONS.	Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory ...	61·7	47·8	54·8	69·5	7	38·8	12
Cape Town (S.A. College) ...	62·7	47·5	55·1	74·0	6	40·0	11
Cape Town (Hospital) ...	61·4	48·9	55·1	70·5	7	42·7	11
Table Mountain (Disa Head)	54·3	43·0	48·6	69·0	6	37·5	9, 15, & 16
Groot Constantia ...	60·9	47·5	54·2	77·0	8	41·0	15
Wynberg ...	61·6	46·4	54·0	78·0	7	39·5	11
Bishopscourt ...	61·8	49·5	55·6	75·0	7	39·0	11
Devil's Peak ...	57·0	44·0	50·5	71·0	6	38·0	15
Blaauwberg ...	60·9	47·6	54·2	74·0	7	40·0	11
Simonstown ...	64·7	51·5	58·1	78·2	7	47·0	11 & 12
Elsenberg (Agri. College) ...	61·4	42·7	52·0	74·1	6	34·4	11
Ceres ...	63·7	34·9	49·3	70·0	1	26·0	11
Danger Point ...	60·5	51·5	56·0	74·0	7	43·0	6
Robertson (Plantation) ...	64·2	40·5	52·3	81·0	7	29·7	10
Port Nolloth ...	62·8	40·4	51·6	89·0	7	33·5	31
George ...	63·8	45·2	54·5	80·0	8	38·0	11
Port Elizabeth ...	66·3	49·4	57·8	79·0	30	42·0	11
Cape Agulhas ...	61·6	50·0	55·8	80·0	7	45·0	11
Cape St. Francis ...	64·0	48·4	56·2	77·0	8	38·0	11
Mossel Bay ...	65·5	48·1	56·8	81·0	7	40·0	11
Van Staaden's ...	65·7	44·6	55·2	80·0	7	36·0	9
Heidelberg ...	64·9	39·3	52·1	80·0	7	30·0	11
Potteberg ...	65·7	44·5	55·1	84·5	2	37·7	11
Concordia (Plantation) ...	64·3	48·5	56·4	80·6	30	41·0	10
Amalienstein ...	64·9	35·9	50·4	77·0	7	26·0	13 & 14
Hanover ...	56·7	25·5	41·1	65·0	18	19·0	16
Murraysburg ...	59·1	30·6	44·8	69·0	8	22·0	10, 13, 14, 22 & 23
Hope Town ...	65·3	30·1	47·7	75·0	8	22·0	20
Kimberley ...	67·1	34·3	50·7	75·0	13	26·1	4
Kenhardt ...	66·6	31·2	48·9	77·0	29	24·0	24
Lovedale ...	66·4	38·2	52·3	81·0	8	29·0	11
Cathcart ...	59·8	37·7	48·8	69·7	8	27·8	11
East London ...	69·1	48·1	58·6	88·0	9	43·0	7 & 30
Sydney's Hope ...	60·5	45·4	52·9	76·5	8	38·0	10
King William's Town ...	68·5	40·0	54·2	86·0	8	30·0	10
Bedford ...	63·5	38·5	51·0	75·0	9 & 28	31·0	10 & 11
Stutterheim ...	65·1	42·0	53·5	75·9	8	33·5	10
Evelyn Valley ...	59·9	42·3	51·1	73·0	27 & 30	34·0	10
Aliwal North ...	64·1	28·7	46·4	71·0	13	18·0	19
Queenstown ...	62·9	35·9	49·4	74·0	8	27·0	19
Rietfontein (Aliwal North) ...	58·4	32·1	45·2	65·4	12	20·1	19
Tabankulu ...	66·0	40·6	53·3	75·0	8	31·0	20
Port St. John's ...	70·2	50·5	60·3	77·0	13	46·0	11
Kokstad ...	63·7	32·3	48·0	75·7	27	24·9	20
Umtata ...	66·0	35·1	50·5	79·0	13	30·0	28
Teyateyaneng ...	61·5	32·0	46·8	66·0	9	24·0	17
Hope Fountain ...	73·1	45·2	59·2	80·9	4	39·0	30
Means ...	63·4	41·6	52·5	75·8	...	33·7	...
Extremes ...	...	...	...	89·0	7	18·0	19

RAINFALL, JUNE, 1908.

I. CAPE PENINSULA:

	INS.
Royal Observatory (*a*) 12 in. gauge	5·82
Cape Town, Fire Station	4·79
Do. South African College	6·82
Do. Molteno Reservoir	7·47
Do. Platteklip	9·24
Do. Signal Hill	4·74
Do. Hospital	4·33
Sea Point, The Hall	4.80
Do. Attridge	
Camp's Bay	5·14
Table Mountain Disa Head	7·97
Do. Kasteel Poort	12·11
Do. Waai Kopje	13·80
Do. St. Michael's	15·37
Devil's Peak Blockhouse	11·61
Do. Nursery	10·31
Do. Lower Gauge	
Woodstock, The Hall	5·42
Do. Municipal Quarry	9·08
Do. do. Nipher's Shield	9·81
Newlands, Montebello	
Claremont, Carrigeen	
Bishopscourt	13·13
Kenilworth	11·61
Wynberg, St. Mary's	9·87
Groot Constantia	11·01
Tokai Plantation	9·96
Plumstead, Culmwood	8·08
Muizenburg (St. Res.)	
Fish Hoek	
Simon's Town, Wood	6·53
Do. Gaol	
Cape Point	2·39
Blaauwberg Strand	2·79
Robben Island	2·85
Durbanville	4·87
Maitland Cemetery	5·52
Tamboer's Kloof (Cape Town)	5·79
Woodhead Tunnel (Table Mountain)	11·66
Lower Reservoir, Table Mountain	7·61

II. SOUTH-WEST:

	INS.
Eerste River	4·36
Klapmuts	5·47
Stellenbosch, Gaol	5·78
Somerset West	6·65
Paarl	4·38
Wellington, Gaol	5·40
Do. Huguenot Seminary	
Groot Drakenstein, Weltevreden	
Porterville Road	2·26
Tulbagh	1·45
Ceres Road	
Kluitjes Kraal	
Ceres	7·86
The Oaks	2·69
Rawsonville	4·46
Caledon	5·47
Worcester, Gaol	1·59
Do. Meiring	
Worcester, Station	

II. SOUTH-WEST (*continued*):

	INS.
Hex River	1·36
De Doorns	
Karnmelks River	4·51
Lady Grey, Division Robertson	
Robertson, Gaol	2·96
Do. Govt. Plantation	2·69
De Hoop	3·43
Montagu	
Danger Point	4·5
Vygebooms Rivier	9·19
Elgin Plantation	8·21
Elsenberg Agricultural College	5·23
Berg River Hoek	
Wemmer's Hoek	
Roskeen	5·86
Vruchtbaar	5·31

III. WEST COAST:

	INS.
Port Nolloth	
Do. (Lieut. Barber)	0·01
Anenous	0·15
Klipfontein	
Kraaifontein	0·03
O'okiep	
Springbokfontein	0·36
Concordia	
Do. (Kraphol)	0·29
Garies	0·47
Lilyfontein	
Van Rhyn's Dorp	0·15
Clanwilliam Gaol	0·44
Do. (Downes)	
Dassen Island	2·08
Kersefontein	1·63
The Towers	2·31
Abbotsdale	
Malmesbury	2·61
Piquetberg	1·89
Zoutpan	
Wupperthal	0·50
Welbedacht	
Hopefield (Gaol)	1·19
Algeria (Clanwilliam)	2·09
Cedarberg (do.)	3·43

IV. SOUTH COAST:

	INS.
Kaap Agulhas	3·91
Bredasdorp	4·82
Swellendam	5·96
Potberg	6·59
Zuurbraak	
Grootvaders Bosch	7·96
Heidelberg	5·61
Riversdale	7·36
Melkhoutfontein	
Vogel Vlei	6·57
Geelbek's Vlei	
Mossel Baai	5·43
Groot Brak River	6·33
George	11·74
Do. (Plantation)	11·65
Do. (Woodifield)	12·88

IV. SOUTH COAST (*con.*) :

	INS.
Ezeljagt	...
Millwood	4·67
Sourflats	1·99
Concordia	5·09
Knysna	...
Buffel's Nek	5·42
Plettenberg Bay	4·72
Harkerville	6·78
Forest Hall	...
Blaauwkrantz	6·42
Lottering	2·76
Storms River	...
Witte Els Bosch	4·30
Humansdorp	2·94
Cape St. Francis	3·61
Hankey	...
Witteklip, Sunnyside	2·53
Van Staden's, Intake	1·88
Do. On Hill	2·33
Kruis River	1·21
Uitenhage (Gaol)	1·45
Do. (Park)	1·72
Do. (Inggs)	...
Armadale, Blue Cliff	0·91
Dunbrody	...
Port Elizabeth (Harbour)	2·68
Do. (Victoria Park)	.
Do. (Walmer Heights)	3·99
Shark's River (Nursery)	2·79
Do. (Convict Station)	2·99
Tankatara	...
Centlivres	0·66
Potteberg	5·85
Edinburgh (Knysna)	5·49

V. SOUTHERN KAROO :

Verkeerde Vlei	...
Bok River	...
Triangle	...
Touws River	...
Do. (D.E. Office)	...
Pietermeintjes	...
Grootfontein	...
Ladismith	1·42
Amalienstein	1·59
Seven Weeks' Poort	...
Calitzdorp	1·49
Oudtshoorn	3·52
Vlakte Farm	...
Uniondale	2 45
Kleinpoort	...
Glenconnor	...
Rust en Vrede	...

VI. WEST-CENTRAL KAROO :

Matjesfontein	...
Laingsburg	...
Prince Albert Road	0·25
Fraserburg Road	0·46
Prince Albert	2·47
Zwartberg Pass	...
Booi's Kraal, Beaufort West	...
Beaufort West (Gaol)	0·50
Dunedin	0·00
Nel's Poort	0·51
Camfers Kraal	0·40
Lower Nel's Poort	...
Krom River	0·17
Baaken's Rug	0·50
Willowmore	0·28

VI. WEST-CENTRAL KAROO (*con.*) :

	INS.
Rietfontein	0·17
Steytlerville	0·51
Lemoenfontein, Beaufort West	0·78

VII. EAST-CENTRAL KAROO :

Buffels Kloof	1·25
Aberdeen (Gaol)	0·63
Do. Bedford	...
Corndale	0·71
Aberdeen Road	...
Klipplaat	...
Winterhoek	...
Klipdrift	...
Kendrew, Holmes	0·68
Do.	0·72
Graaff-Reinet (Gaol)	1·21
Do. (Eng. Yard)	1·23
Do. (College)	...
Nieuw Bethesda	0·77
Roodebloem	...
Glen Harry	0·30
Wellwood	0·38
Do. Mountain	...
Bloemhof	0·45
Jansenville	0·68
Patrysfontein	...
Bethesda Road	...
Afrikander's Kloof	...
Roode Hoogte	0·37
Toegedacht	0·20
Klipfontein	0·81
Cranemere	...
Pearston	0·85
Darlington	...
Walsingham	0·47
Arundale	...
Doornbosch, Zwagershoek	...
Middlewater	1·01
Somerset Oost (Gaol)	1·39
Do. Do. College	...
Longhope	...
Cookhouse	0·65
Middleton	...
Spitzkop, Graaff-Reinet	0·74
Bruintjes Hoogte	...
Grobbelaars Kraal	0·86

VIII. NORTHERN KAROO :

Calvinia	0·22
Middlepost	...
Brandvlei	...
Onderste Doorns	...
Sutherland	0·22
Fraserburg	0 00
Scorpions Drift	...
Rheboksfontein	...
Klein Vlei	...
Carnarvon	0·00
Loxton	...
Beyersfontein	...
Wagenaars Kraal	...
Brakfontein	0·36
Victoria West	0·02
Omdraais Vlei	...
Doornkuilen	...
Britstown	0·00
Wildebeestkooij	0·00
Murraysburg	0·12
De Kruis, Murraysburg	0·46
Richmond	0·17
De Aar	...

VIII. NORTHERN KAROO (*con.*):

	INS.
Middlemount	
Hanover	0·00
Theefontein	0·00
Zwagersfontein	
Philipstown	0·00
Boschfontein	
Petrusville	0·00
The Willows, Middelburg ...	0·00
Naauwpoort	
Middelburg (Gaol)	0·68
Do.	
Middelburg Government Farm	
Jackalsfontein	
Ezelpoort	
Plaatberg	
Grape Vale	
Ezelfontein	
Roodepoort	
Groenkloof	
Vlakfontein	
Vogelsfontein	
Plaatfontein	
Colesberg	0·52
Tafelberg Hall	
Rietbult (Colesberg Bridge) ...	
Visch Rivier	0·29
Varkens Kop	0·26
Culmstock	
Droogefontein	
Stonehills	
Cradock (Gaol)	0·57
Witmoss	0·83
Varsch Vlei	
Maraisburg	0·27
Steynsburg (Gaol)	0·96
Riet Vlei	
Hillmoor	1·01
Quagga's Kerk	
Tarkastad	0·83
Do. (Dis. Engineer) ...	
Drummond Park	0·85
Glen Roy	
Waverley	0·57
Gannapan	
Montagu...	
Grape Vale	
Rietfontein, Cradock ...	
Schuilhoek	0·00
Vosburg	0·00
Zwavelfontein	0·00
Holle River, Colesberg ...	
The Meadows, Schoombie ...	
Wolve Vlei, Middelburg ...	0·59
Hartebeestefontein, Steynsburg .	1·04
Willowwalk, Tarkastad ...	0·96

IX. NORTHERN BORDER:

	INS.
Pella	0·00
The Halt	0·00
Keimoes	
Kenhardt	0·00
Upington	
Trooilapspan	0·00
Van Wyk's Vlei	0·00
Prieska	
New Year's Kraal	
Dunmurry	
Karree Kloof	0·00
Griquatown	0·00
Campbell	
Douglas	0·00

IX. NORTHERN BORDER (*con.*):

	INS.
Avoca, Herbert	
Hope Town	0·00
Orange River	
Newlands, Barkly West ...	0·07
Barkly West	0·17
Bellsbank	
Kimberley (Gaol)	0·28
Do. Stephens ...	0·22
Strydenburg	
Stoffkraal (Prieska) ...	0·00

X. SOUTH EAST:

	INS.
Melrose (Div. Bedford) ...	0·95
Dagga Boer	1·29
Fairholt	1·20
Lynedoch	
Alicedale	
Cheviot Fells	
Bedford (Gaol)	1·94
Do. (Hall)	1·87
Sydney's Hope	1·47
Cullendale	1·44
Adelaide...	1·75
Atherstone	0·84
Alexandria	1·88
Salem	1·40
Fort Fordyce	1·76
Fountain Head	
Graham's Town (Gaol) ...	1·21
Do. Do.	
Heatherton Towers	
Sunnyside	1·15
Vischgat...	
Fort Beaufort	1·44
Katberg	2·75
Balfour	2·47
Seymour...	1·67
Glencairn	2·22
Alice	1·71
Lovedale...	2·19
Port Alfred	2·76
Hogsback	2·08
Peddie	
Exwell Park	
Keiskamma Hoek	1·85
Cathcart (Gaol)	1·30
Cathcart (Foreman)	1·33
Cathcart...	1·38
Thaba N'doda	3·00
Evelyn Valley	4·36
Crawley	
Thomas River	1·46
Perie Forest	1·86
Forestbourne	2·09
Isidenge	2·13
Kologha	1·41
King William's Town (Gaol) ...	1·39
Do. Do. Dr. Egan	2·05
Stutterheim, Wylde... ...	0·65
Do. Besté	
Fort Cunynghame	1·79
Dohne	2·12
Kubusie	1·63
Quacu	1·59
Blaney	1·46
Kei Road	
Berlin	
Bolo	1·77
Fort Jackson	2·59
Prospect Farm, Komgha ...	
Komgha (Gaol)	2·12

X. SOUTH-EAST (*continued*):	INS.
Chiselhurst	4·13
East London West	4·63
East London East	
Cata	1·86
Wolf Ridge	2·17
Dontsah	2·24
Mount Coke	
Blackwoods	1·90
Albert Vale (Near Bedford	0·90
Huxley Farm (Stutterheim)	1·62

XI. NORTH-EAST:	
Venterstad	0·40
Mooifontein	1·11
Burnley, Cyphergat	
Burghersdorp (Gaol)	1·02
Ellesmere	0·97
Molteno	
Lyndene	
Cyphergat	1·36
Thibet Park	1·09
Sterkstroom Station	
Do. Gaol	
Rocklands	0·49
Aliwal North, Gaol	1·00
Do. Brown	
Do. Dist. Engineer	
Buffelsfontein	
Hex's Plantation	
Poplar Grove	
Carnarvon Farm	1·08
Halseton	
Jamestown	1·25
Whittlesea	0·63
Queenstown, Gaol	0·93
Do. Beswick	0·99
Rietfontein, Aliwal North	1·41
Middlecourt	
Dordrecht	1·08
Tylden	
Nooitgedacht	
Herschel	2·29
Lady Grey	1·93
Lauriston	1·75
Lady Frere	0·95
Contest (Near Bolotwa)	1·28
Sterkspruit	
Doornkop	
Avoca, Barkly East	
Keilands	1·04
Palmietfontein	
Barkly East	1·33
Blikana	2·15
Glenlyon	
Rhodes	
Gateshead	
Cliftonvale	
Albert Junction	1·00
Queenstown (District Engineer's Office)	
Hughenden	0·46
Glenwallace	0·98
Indwe (District Engineer's Office)	
Bensonvale Inst., Herschel	
Cathcart, Queenstown	
Royal, Div. Albert	
Broughton, Molteno	1·34
Hopewell, Imvani	0·84
Sunny Meade, Albert	0·90
Castle Hill, Aliwal North	0·80

XII. KAFFRARIA:	INS.
Ida, Xalanga	1·10
Slaate, Xalanga	1·54
Cofimvaba	0·36
Tsomo	0·89
N'qamakwe	1·16
Main	
Engcobo	0·52
Butterworth	1·00
Woodcliff	
Kentani	2·44
Maclear	
Idutywa	
Bazeya	1·57
Willowvale	1·84
Mount Fletsher	0·87
Somerville, Tsolo	0·47
Elliotdale	0·92
M'quanduli	
Matatiele	
Umtata	0·60
Cwebe	2·19
Tabankulu	0·49
Mount Ayliff	
Kokstad	0·21
Do., The Willows	0·31
Seteba	
Flagstaff	0 53
Insikeni	0·27
Port St. John's	1·53
Kilrush, Sneezewood	
Umzimkulu	0·06
Mandileni	
Wanstead	
Cedarville	
Tent Kop, Elands Height	1 30
Confluence, Matatiele	0·16
Umzimkulu, Strachan	0·12

XIII. BASUTOLAND:	
Mafeking	
Mohalies Hoek	1·71
Maseru	0·93
Teyateyaneng, Berea	1·92
Moyeni Quthing	
Qacha's Nek	0·76
Leribe	
Butha Buthe	

XIV. ORANGE RIVER COLONY:	
Bloemfontein	

XV. NATAL:	
Durban, Observatory	0·52

XVI. TRANSVAAL:	
Johannesburg	

XVII. BECHUANALAND:	
Taungs	0·11
Vryburg	0·09
Mafeking	0·00
Setlagoli	0·00
Kuruman	
Zwartlaagte	
Armadillo Creek, Vryburg	0·04

XVIII. RHODESIA:	
Hopefountain	0·00
Rhodes Matoppo Park	0·00

XIX. DAMARALAND:	
Walfish Bay	

DEPARTMENTAL PUBLICATIONS.

The following Departmental Publications are obtainable on application to the *Controller of Printing and Stationery, Cape Town.* Except in the case of those specially priced in the list the charge is 3d. each, post free in South Africa. Those publications marked * are obtainable in Dutch.

Agriculture.—Artificial Grasses and Fodder for Stock (6d.); Ensilage; Treatment of Cereal and other Crops (6d.); *Wheat Production in Australia, by Halse and Visser (1s. 6d.); Hop Cultivation; *Brak Land in relation to Irrigation and Drainage; *Culture and Curing of Turkish Tobacco in Cape Colony; The Velvet Bean; Potato Disease; Scheme of Manurial Experiments; Sundry Forage Crops for trial in Cape Colony; Salt Bushes; Tobacco Culture (P. Bornemisza); Cultivation of Tobacco in the Colony (K. Schenck); *The Process and Appliances for the flue-curing of Tobacco; *Wheat Production in Australia (A. C. Macdonald) (1s. 6d.); Ensilage or the Preservation of Green Fodder; Destruction of Prickly Pear, experiments upon; *Culture of Tobacco in the Kat River Valley.

Dairying.—Dairying (6d.); *Dairy Industry in Great Britain (6d.); Ready Reckoner for Cream Testing (1s.); *Cheddar Cheese Making, R. Silva Jones; *Dairy Industry in Denmark.

Entomology.—Locusts and their Destruction (6d.); Caterpillars destroying Trees; Codling Moth in Madeira Fruit; *Codling Moth; Fruit Fly; Fumigation Supplies; Methods of Locust Destruction; Pear Slug, Paris Green (Insect Notes); Remedy for Mest Wurmen; *Spray Pump Notes; Recently introduced Borer-Beetle; Scale Insects on Ornamental Trees and Plants; New Oak Tree Pest; Nurseries Inspection and Quarantine Bill; Wattle Bag Worm; Bordeaux Mixture; Deaths Head Moth Superstition; Anthracnose in Constantia; Antestia Fruit Bug; Another Introduced Scale Pest; The Fruit Moth; Snails and Caterpillars in Lucerne; The Brazil Fruit Fly Parasites; *Cyanide Gas Remedy for Scale Insects; Gas Treatment for Scale Insects; *Two Fruit Tree Beetles.

Forestry.—Forestry (6d.); British National Forestry; Botanical Observations on Forests in Eastern Pondoland; Indigenous Timbers of the Cape; Misuse of Coal and the Uses of Forests; Tree Planting for Timber and Fuel; *Tree Planting for Farmers.

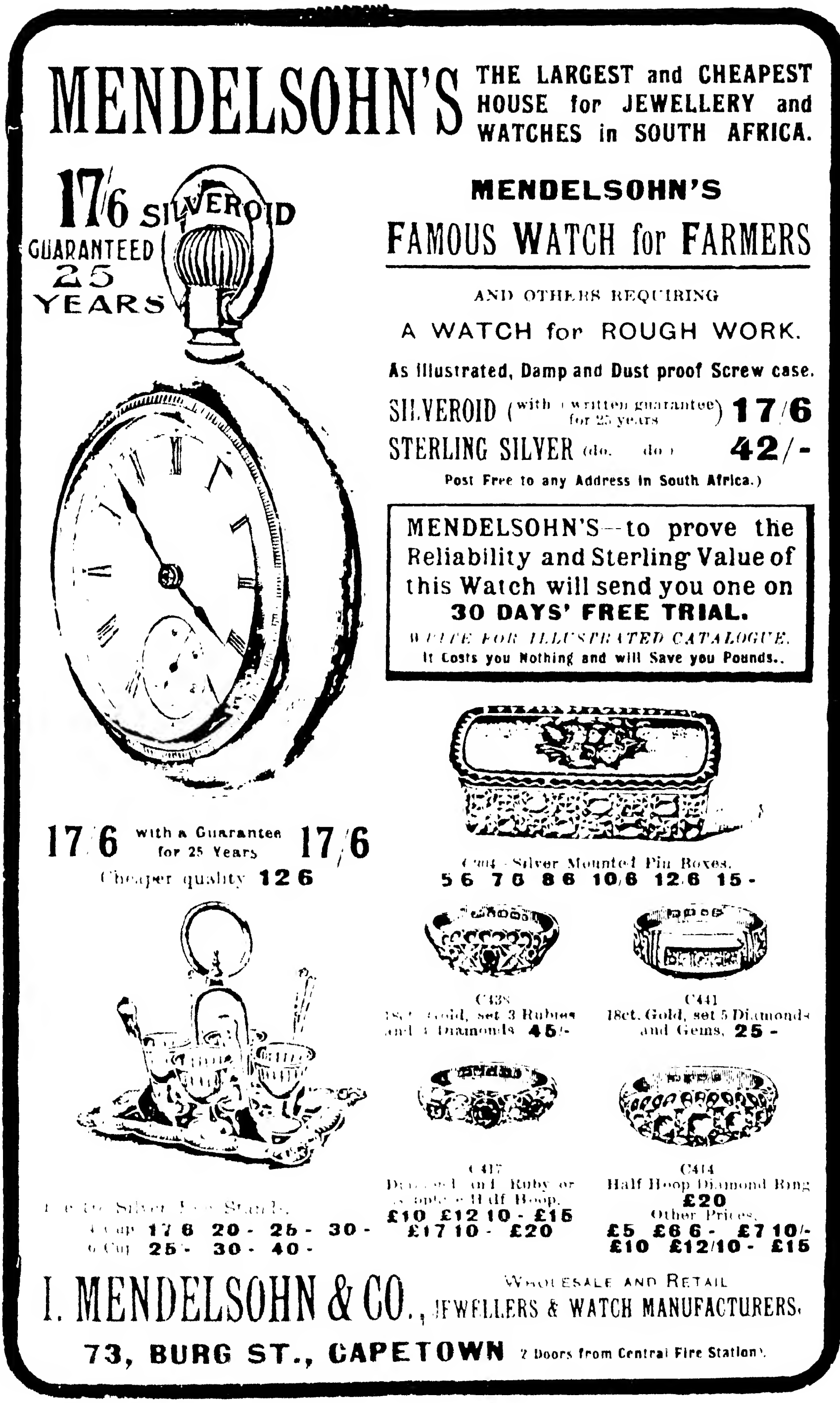
Horticulture.—Netting for Fruit Trees; *Fruit Culture in the Gamtoos River Valley; Marketing of Fruit; The Olive at the Cape; Fruit Culture in Argentina; Vegetables for Exhibition; *Citrus Culture in the Cape Colony; Treatise on Citrus Culture from Seed to Fruit; *Fruit Tree Pruning; *Fruit from Orchard to Buyer; White Mulberry in Cape Colony

Veterinary and Animal Industry.—Arsenite of Soda Dipping Mixture; Horse Sickness; *Poisoning of Stock; Persian Sheep and Heartwater; Bots or Paapjes; Indigestion and Diarrhœa in Calves; Husk, Hoose or Parasitic Disease of the Lungs of Cattle, etc.; *The Eye and its Diseases; *Redwater, Texas Fever or Tick Disease; *Glanders; *Animal Castration; *Preventive Inoculation for Redwater; *Abortion in Cattle; *Rinderpest in South Africa; Styfziekte and Lamziekte; *Fluke or Slak in the Liver of Sheep; Redwater in Cattle; *Anthrax or Miltziekte and Quarter Evil or Sponsziekte; *Preventive Inoculation against Miltziekte; *Osteo-Porosis; Cirrhosis of the Liver in Stock; *Retention of the Fœtal Membrane or Afterbirth in Cows; Castration of Ostriches; Stijfziekte, Lamziekte or Osteo Malacia and Paralysis; Castration of Animals (the Horse); *Lungsickness of Cattle, Contagious Pleuro-Pneumonia, etc.; *Swine Fever, Hog Cholera or Pig Typhoid; Notes on the Co-Relation of several Diseases occurring among Animals in South Africa; Castration of Females and Animals other than the Horse; Dr. Kohlstock's Report on his Rinderpest Investigations at Kimberley; Professor Koch's Report on his Rinderpest Investigations at Kimberley;

*Poisoning of Horses by Ornithogalum-Thrysoides or Chinkerinchee; Horses suitable for Military Requirements; Ticks and African Coast Fever; *Liver Disease in Calves; Lampas; Swine Fever; *Tuberculosis and the Use of Tuberculin; *Lungsickness in Cattle; *Treatment for Worms in Domestic Animals; *Malarial Catarrhal Fever in Sheep; *Inoculation against Rinderpest; *Miltziekte en Sponsziekte; *Heartwater; *Anthrax, Charbon, Miltzbrand or Miltziekte; *African Coast Fever, with description of Dipping Tank.

Viticulture.—Viticulture and Wine Making (6d.); *Manufacture of Dry Wines in Hot Countries; *Reconstitution of Phylloxerised Vineyards (1s.); *How to treat Wine Casks; The Making of Wine and its Bye-Products (6d.); *Report on Failure of Hanepoot Grapes on American Vines; Grafting of American Vines; Vine Culture as exemplified at the Paris Exhibition; Wine Making, Further Notes on, by G. Paine.

Miscellaneous.—*Poultry in South Africa; Fertility of some Colonial Soils as Influenced by Geological Conditions; *Mining Laws; The Protection of Trout; Trout and Carp Breeding and Stocking of Streams; *Locust Birds and Locust Poison; Land Laws of Cape Colony; Rainfall of South Africa; Game Seasons; Transvaal Plant Import Regulations; Preservation of Game in Cape Colony; The Ocean and its Resources; Possible New Industries for Cape Farmers (6d.); Arsenate of Lead; Blepharis Capensis; *Method of Preserving Fish by Smoking; *Monsonia, Cape Cure for Dysentery.


MENDELSOHN'S
THE LARGEST and CHEAPEST HOUSE for JEWELLERY and WATCHES in SOUTH AFRICA.
17/6 SILVEROID
GUARANTEED 25 YEARS
MENDELSOHN'S
FAMOUS WATCH for FARMERS
AND OTHERS REQUIRING
A WATCH for ROUGH WORK.
As Illustrated, Damp and Dust proof Screw case.
SILVEROID (with written guarantee for 25 years) 17/6
STERLING SILVER (do. do.) 42/-
Post Free to any Address in South Africa.)
MENDELSOHN'S—to prove the Reliability and Sterling Value of this Watch will send you one on
30 DAYS' FREE TRIAL.
WRITE FOR ILLUSTRATED CATALOGUE.
It Costs you Nothing and will Save you Pounds..
17/6 with a Guarantee for 25 Years 17/6
Cheaper quality 12/6
Silver Mounted Pin Boxes.
5/6 7/6 8/6 10/6 12/6 15/-
C438
18ct. Gold, set 3 Rubies and Diamonds 45/-
C441
18ct. Gold, set 5 Diamonds and Gems, 25/-
C417
Half Hoop.
£10 £12 10 - £15
£17 10 - £20
C414
Half Hoop Diamond Ring
£20
Other Prices,
£5 £6 6 - £7 10/-
£10 £12/10 - £15
17/6 20/- 25/- 30/-
25/- 30/- 40/-
I. MENDELSOHN & CO.,
WHOLESALE AND RETAIL
JEWELLERS & WATCH MANUFACTURERS.
73, BURG ST., CAPETOWN (2 Doors from Central Fire Station).

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 1st August, 1908, ruling at the several centres named, is published for general information.

CENTRE.	A. Wheat per 100 lbs. £ s. d.	B. Wheat Flour per 100 lbs. £ s. d.	C. Boer Meal per 100 lbs. £ s. d.	D. Mealies per 100 lbs. £ s. d.	E. Mealie Meal per 100 lbs. £ s. d.	F. Barley per 100 lbs. £ s. d.	G. Oats per 100 lbs. £ s. d.	H. Oat-hay per 100 lbs. £ s. d.
Aliwal North ..	0 9 6	0 19 6	0 12 0	0 6 0	0 7 6	0 7 6	0 10 0	0 5 6
Beaufort West ..	0 12 6	1 0 0	0 14 6	0 7 9	0 10 0	0 9 6	0 9 6	0 6 6
Burghersdorp ..	0 10 0	0 16 6	1 7 0	0 7 6	0 17 6	0 8 6	0 15 0	0 6 6
Cape Town ..	..	..	..	..	..	0 7 0	0 6 0	3/3 to 3/6
Clanwilliam ..	0 14 0	..	0 15 0	0 8 0	0 10 0	0 8 0	0 8 0	..
Colesberg ..	0 16 0	..	..	0 12 6	..	0 14 0	..	5/3 to 5
Cradock ..	0 11 0	..	0 12 6	0 6 6	..	0 7 0	..	0 6 9
Dordrecht ..	0 9 0	0 14 0	0 13 6	0 8 0	0 9 0	0 8 0	0 16 0	0 5 3
East London ..	0 10 6	0 14 6	1 3 6	0 7 0	0 15 0	0 8 6	0 9 0	0 5 6
Graaff-Reinet ..	0 11 0	..	0 12 0	0 7 0	..	0 7 6	0 9 0	0 6 0
Grahamstown ..	0 11 9	..	..	0 8 0	..	0 9 0	0 8 9	0 6 6
Kimberley ..	0 9 3	0 16 0	0 13 9	0 4 3	0 5 9	0 5 6	0 7 0	0 4 9
King William's Tn. ..	0 8 6	0 17 0	0 13 6	0 6 3	0 7 6	0 6 0	0 7 6	0 5 0
Malmesbury ..	0 10 0	0 17 6	0 12 6	0 7 6	..	0 6 9	0 6 0	0 2 6
Mossel Bay ..	0 14 0	0 16 0	0 15 0	0 7 6	0 8 0	0 5 6	0 7 0	0 4 6
Port Alfred ..	0 12 0	0 18 0	0 16 0	0 8 0	0 13 0	0 10 0	0 10 0	0 5 0
Port Elizabeth ..	0 10 6	..	..	0 7 0	..	0 8 0	..	0 5 0
Queenstown ..	0 10 0	0 15 6	0 13 3	0 6 0	0 7 6	0 9 6	0 10 0	0 5 0
Tarkastad ..	0 14 0	0 10 6	0 16 6	0 8 0	0 10 0	0 8 0	0 8 6	0 7 6
Vryburg ..	0 15 0	0 17 6	0 16 0	0 8 0	0 9 0	0 11 0	0 11 0	0 3 0
Worcester ..	0 10 6	0 16 0	0 12 0	0 7 6	0 8 0	0 7 6	0 6 0	0 3 6

CENTRE.	J. Potatoes per 100 lbs. £ s. d.	K. Tobacco (Boer Roll) per lb. £ s. d.	L. Beef per lb. £ s. d.	M. Mutton per lb. £ s. d.	N. Fresh Butter per lb. £ s. d.	O. Eggs per doz. £ s. d.	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
Aliwal North ..	0 8 6	0 2 0	0 0 7	0 0 6	0 1 9	0 1 0	£9	12/- to 15/-
Beaufort West ..	0 10 0	0 0 7	4d. to 10d.	4½d. to 5½d	0 1 9	0 2 0	£9	16/6
Burghersdorp ..	0 6 0	0 0 6	0 0 6	0 0 4½	0 2 0	0 2 0	..	..
Cape Town ..	16/- pr. 150 lbs	..	..	..	0 1 4	0 1 6	..	..
Clanwilliam ..	0 9 0	0 1 0	0 0 7	0 0 6	0 1 3	0 1 3	..	..
Colesberg ..	10/6 - to 15/6	..	..	..	1/7 to 2/3	0 1 6	..	..
Cradock ..	0 14 3	0 0 9	0 0 5	0 0 4	0 1 9	0 2 0	..	10/
Dordrecht ..	0 8 0	0 1 0	0 0 4	0 0 4	0 1 6	0 1 0	£8	12/6
East London ..	0 10 0	0 1 0	0 0 4	0 0 5	0 2 0	0 1 1	£10	19/-
Graaff-Reinet ..	0 12 0	0 0 3	0 0 4	0 0 4	0 2 0	0 1 0	£10	15/-
Grahamstown ..	0 12 4	0 0 6	0 0 6	0 0 6½	0 1 10	0 1 3	..	..
Kimberley ..	0 10 9	0 0 5	0 0 7	0 0 6	..	0 1 5	£8 10s.	11/9
King William's Tn. ..	0 8 0	0 0 7	0 0 4	0 0 4	0 1 10	0 1 0	£11	19/-
Malmesbury ..	0 14 6	0 3 0	..	..	0 1 3	0 1 3	£11 10s.	22/-
Mossel Bay ..	0 8 0	0 0 6	0 0 7	0 0 8	0 1 9	0 1 3	..	..
Port Alfred ..	0 7 6	0 0 9	0 0 6	0 0 9	0 1 6	0 0 6	..	..
Port Elizabeth ..	0 12 0	..	0 0 6	0 0 6	0 1 8	0 1 3	..	..
Queenstown ..	0 8 0	0 0 7	0 0 5	0 0 5	0 2 0	0 1 0	£12 to £14	18/- to 22/-
Tarkastad ..	0 7 0	0 0 6	0 0 4*	0 0 4*	0 1 6	0 1 6	£10	20/-
Vryburg ..	0 10 0	0 0 8	*5d. to 9d. †5d. to 9d.	*5d. to 6d. †5d. to 6d.	0 1 6	0 1 6	£8 to £13	12/6 to 20/9
Worcester ..	0 9 0	0 0 5	4d. to 9d	5d. to 6d.	0 1 6	0 1 0	£7 19s to £12	17/6 to 20/-

NOTE.—A blank space denotes "no transactions" * Colonial. † Imported.

PRODUCE MARKETS.

CAPE TOWN.

Mr. R. Muller (Produce Department) reports for the month ending July 31:—

Ostrich Feathers.—The Market has been well supplied. For all good quality there is an active demand, and prices remain very firm, especially for broad wing feathers. Common qualities still remain neglected. The London Sales opened on the 27th July. Best wings were firm, while common were easier; dark femina advanced 10 per cent., blacks 15 per cent.; Spadonas were 10 per cent. lower.

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
Super Primes ...	15	0	0	35	0	0	Floss	0	5	0	1	10	0
First, ordinary to Super	10	0	0	14	0	0	Long Drabs	2	0	0	3	10	0
Seconds	5	0	0	8	0	0	Medium Drabs ...	1	0	0	1	10	0
Thirds	3	0	0	4	0	0	Short to Medium ...	0	5	0	1	0	0
Femina Super ...	10	0	0	15	0	0	Floss	0	5	0	1	10	0
Do., Seconds to Firsts	3	10	0	8	0	0	White Tails	1	10	0	2	10	0
Byocks (Fancy) ...	5	0	0	9	0	0	Coloured Tails ...	0	5	0	1	5	0
Long Blacks	3	10	0	7	0	0	Chicks...	0	1	0	0	2	0
Medium Blacks ...	2	0	0	2	10	0	Spadonas	2	0	0	3	0	0
Short to Medium ...	0	10	0	1	15	0	Inferior Black and Drabs, short to long	0	0	6	1	10	0

Wool.—The London sales opened on the 14th of last month. Grease wools were unchanged, and snow whites from par to 5 per cent. lower. There was a good enquiry, and a better tone prevailed. Since the opening, the Sales have progressed without undergoing much change; occasionally good combing grease showed an advance. In our Market, long wools of combing description found purchasers readily, while ordinary quality and wasty lots were difficult of sale. Karroo Grease for combing may be quoted from 5½d. to 6½d., according to yield; Medium from 4¼d. to 5d.; Calvinia Grease from 4¾d. to 5½d.; Extra Super Snow Whites from 1s. 4½d. to 1s. 6d.; Ordinary from 1s. to 1s. 2d., but quotations are more or less nominal.

	s.	d.	s.	d.		s.	d.	s.	d.
Super long Grass Veld ...	0	7	0	7½	Wool for Washing	0	4½	0	5½
Do. Karoo	0	5½	0	6¾	Snow-white Super to Extra	1	4	1	7
Medium	0	4	0	5	Do. Ordinary ...	1	1	1	4
Short and inferior	0	3½	0	4	Fleece Washed	0	0	0	8

Mohair.—There appears to be a better feeling in the Market, and considerable transactions have taken place during the last week. It must be remembered, however, that good quality only is enquired for. Mixed parcels and rough quality hair remain difficult of sale. A sale of Mohair in London is now proceeding. Prices are somewhat firmer, and a more hopeful tone prevails.

	s.	d.	s.	d.		s.	d.	s.	d.
Firsts, Summer	0	7½	0	9	Winter	0	6	0	7½
Kids	1	0	1	4	Do. Kids...	0	11	1	0
Seconds	0	5½	0	6					

Hides and Skins.—There is a keen demand for all classes. Light Goat Skins and Capes are firmer; other sorts remain unchanged.

	s.	d.	s.	d.		s.	d.	s.	d.
Long woolled Skins ...	0	4½	0	4¾	Goat, heavy to light ...	0	7½	0	10½
Short...	0	3	0	3½	Sundried	0	0	0	5
Shorn	0	2¾	0	3	Angoras	0	0	0	4
Bastards	0	2¾	0	3	Sundried Hides	0	5	0	5½
Cape Skins, each	1	4	1	9	Salted	0	4	0	5
Do., cut, each ...	0	0	0	9	Wet...	0	3	0	3½

PORT ELIZABETH.

Messrs. John Daverin and Co. report under date July 31:—

Ostrich Feathers.—The London Sales opened on Monday last, and our cable reported: "Blacks and Floss 10 per cent. higher, common Whites, Feminas, and Spadonas 10 per cent. lower, all other sorts unchanged." Since then we received further cable news to the effect that best Whites were 10 per cent. dearer, and our closing cable,

just received, reads: "Sales closed strong." Our local market was again heavily supplied this week with a fair average assortment. Competition, though at times irregular, was fairly active for all good qualities, for which satisfactory prices were obtained, but common sorts were neglected and brought low prices. The total quantity sold on the public market this week realised £14,395 1s. 4d., and weighed 6,037 lbs. 15¼ ozs. Very little business has been done out of hand. Next week buyers will start operating for the London December sales, and with such a long interval it is possible we may have a weaker market, but we do not anticipate that really good lots will show any change. The shipments from this port this week are likely to be exceptionally heavy, including some parcels from Oudtshoorn.

	£	s.	d.		£	s.	d.
Primes: Extra Super				Special Prices.			
Good to Super ...	14	0	0	to	25	0	0
Whites: Firsts ...	10	0	0	„	14	0	0
Seconds ...	5	0	0	„	8	10	0
Thirds ...	0	15	0	„	3	0	0
Feminas: Super ...	9	0	0	„	15	0	0
Firsts ...	6	10	0	„	9	10	0
Seconds ...	3	10	0	„	6	10	0
Thirds ...	0	10	0	„	2	0	0
Greys ...	1	10	0	„	6	10	0
Fancy	4	0	0	„	8	0	0
Tails: White	0	12	6	„	2	10	0
Light	0	10	0	„	1	15	0
Coloured & Dark	0	1	0	„	0	15	0

	£	s.	d.		£	s.	d.
Blacks: Long ...	2	10	0	to	6	0	0
Medium ...	1	0	0	„	3	0	0
Short ...	0	5	0	„	1	0	0
Wirey ...	0	0	3	„	0	0	6
Floss ...	0	5	0	„	1	15	0
Drabs: Long... ...	1	0	0	„	3	0	0
Medium ...	0	12	6	„	1	10	0
Short... ...	0	2	6	„	0	6	0
Wirey ...	0	0	3	„	0	0	6
Floss... ...	0	5	0	„	2	0	0
Spadonas: Light ...	0	5	0	„	3	0	0
Dark ...	0	2	6	„	1	10	0
Chicks...	0	0	3	„	0	1	6

Wool.—The London Sales are progressing without further change. Our market remains steady, but the amount of business done in the open market during the week has been limited, chiefly owing to holders refusing to accept current prices. At present there appears to be little prospect of any immediate improvement: on the other hand, we think it likely that prices may again recede. On the public market, yesterday, only a small quantity was offered, prices showing no change.

Snowwhite, Extra Superior ...	17d	to	17½d
Do. Superior	16d	„	16½d
Do. Good to Superior...	15d	„	15½d
Do. Inferior Faulty ...	13d	„	14d
Grease, Super Long, well-conditioned, Grassveldt grown (special clips) ...	6½d	„	7d
Do. do. do. ...	5½d	„	6d
Do. do. Karoo grown (special clips)	5½d	„	5d
Do. do. do. ...	4¾d	„	5d
Do. do. Mixed Veldt...	5d	„	5½d
Do. Light, faultless, medium Grassveldt grown ...	5d	„	5½d
Do. do. Karoo grown	4½d	„	5d
Do. do. short, do.	4d	„	4¼d

Grease, Coarse and Coloured ...	1½d	to	2⅞d
Scoured do. do. ...	2d	„	9½d
Basuto Grease, short	5d	„	5d
O.R.C. Grassveldt Grease, long & well-conditioned (special clips)	5½d	„	6d
Do. do. do. ...	4½d	„	5d
Do. do. medium grown, light, with little fault	4½d	„	4¾d
Do. do. short, faulty & wasty	¾d	„	4d
Do. do. Karoo grown, long & well-conditioned ...	4½d	„	4¾d
Do. do. medium grown, light with little fault ...	3½d	„	4d
Do. do. short, faulty and wasty...	3¼d	„	3¼d

Mohair.—The market has been rather quiet during the week, which is partly accounted for by the fact that buyers and sellers are awaiting with interest the result of the public sale of 1,000 bales mohair which is to be held in London to-day. On the public market on Tuesday a fairly large quantity was offered, chiefly made up of mixed parcels. Competition was more active, and prices showed some improvement.

Super Kids	15d	to	16d
Ordinary Kids and Stained ...	12d	„	13d
Superior Firsts, special clips	9½d	„	10d
Ordinary Firsts...	7½d	„	8½d
Short Firsts and Stained ...	7d	„	7d
Superfine Long Blue O.R.C. Hair	8d	„	8½d

Mixed O.R.C. Hair (average)	6¾d	to	7½d
Do. very mixed ...	6d	„	6½d
Seconds and Grey	5d	„	6d
Thirds	3½d	„	3½d
Winter Kids, special clips	...none offering		
Do. good ordinary	...none offering		
Winter Hair	...none offering		
Basuto Hair (nominal) ...	7½d	to	8d

Skins.—This market is decidedly firmer. Sheepskins, in bundles, 4⅝d.; Pelts, 3¼d.; Goatskins, 9¾d., damaged, 5d. per lb.; Angoras, 4¾d.; Shorn, 3¾d., damaged, 2¾d. per lb.; Springbok, 8d. each; Johannesburg Goat, 8d.; Angoras, 4d.

Hides.—Sundries 6¾d., damaged 5¾d., Salted 5¾d., damaged 4¾d., Thirds 3⅛d., Madagascar Hides 4d., damaged 3d.

Horns.—3½d. each all round.

SECOND EGG LAYING COMPETITION.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

RECORD FOR JULY, 1908, AND TOTALS TO END OF JULY.

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date. Eggs.	Total per Pen to date. Weight ozs.
1	C. H. van Breda	White Leghorns	1	23	$43\frac{7}{8}$		
			2	19	$36\frac{3}{16}$		
			3	21	$36\frac{7}{16}$		
			4	12	$23\frac{5}{8}$	162	$295\frac{3}{4}$
2	F. Muller ...	Black Minorcas	5	18	$39\frac{1}{8}$		
			7	2	$3\frac{3}{4}$		
			8	1	$2\frac{1}{8}$	31	65
3	H. Chas. Starke	Buff Orpingtons	9	19	$34\frac{11}{16}$		
			10	15	$31\frac{3}{16}$		
			11	17	$32\frac{13}{16}$	91	$167\frac{1}{2}$
4	J. W. Wright ...	White Wyandottes	13	9	$17\frac{1}{4}$		
			15	24	$53\frac{5}{8}$	53	$110\frac{3}{4}$
5	C. H. van Breda	White Leghorns	17	22	$41\frac{5}{8}$		
			18	21	$39\frac{3}{16}$		
			19	23	$50\frac{1}{2}$		
			20	23	$44\frac{3}{8}$	191	$365\frac{7}{8}$
6	F. T. Hobbs ...	Silver Wyandottes	22	2	$3\frac{3}{4}$	55	$100\frac{3}{16}$
7	H. D. Bradley...	Silver Wyandottes	26	8	$14\frac{3}{16}$		
			27	5	$8\frac{7}{8}$		
			28	21	$39\frac{13}{16}$	49	$91\frac{9}{16}$
8	J. G. Lay ...	White Leghorns	29	19	$36\frac{5}{16}$		
			30	25	$52\frac{1}{8}$		
			31	8	$17\frac{1}{16}$		
			32	18	$33\frac{5}{16}$	91	$181\frac{1}{4}$
9	C. H. van Breda	White Leghorns	33	20	$37\frac{5}{16}$		
			34	21	$39\frac{13}{16}$		
			35	21	$40\frac{1}{8}$		
			36	20	$38\frac{11}{16}$	133	$251\frac{9}{16}$
10	R. Johnston ...	Buff Orpingtons	37	3	$5\frac{5}{8}$		
			38	13	$22\frac{3}{4}$		
			39	19	$32\frac{5}{16}$	63	114

RECORD FOR JULY, 1908, AND TOTALS TO END OF JULY—*continued.*

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date. Eggs.	Total per Pen to date. Weight ozs.
11	S. Smith ...	Silver Pencilled Wyandottes	41	17	$30\frac{5}{8}$		
			42	5	$7\frac{1}{16}$		
			43	16	$26\frac{1}{2}$	50	$81\frac{13}{16}$
12	(Vacant).		...	...	...	...	...
13	S. Smith ...	Brown Leghorns	49	16	$30\frac{5}{16}$		
			50	2	$3\frac{11}{16}$		
			51	8	$15\frac{3}{8}$		
			52	4	$7\frac{5}{8}$	30	57
14	Clifford Hoole...	Black Minorcas	54	22	$33\frac{5}{8}$		
			55	19	$32\frac{11}{16}$		
			56	22	42	175	$296\frac{13}{16}$
15	S. Smith ...	White Leghorns	57	12	$23\frac{1}{16}$		
			58	24	$42\frac{5}{8}$		
			59	13	$26\frac{1}{16}$		
			60	20	$35\frac{13}{16}$	169	$302\frac{3}{4}$
16	S. Smith ...	White Leghorns	61	20	$34\frac{8}{16}$		
			63	10	$19\frac{5}{16}$		
			64	21	$37\frac{7}{16}$	168	$289\frac{7}{16}$
17	W. R. Allen ...	White Leghorns	65	19	$32\frac{1}{16}$		
			66	17	$37\frac{5}{16}$		
			67	12	$23\frac{1}{16}$		
			68	17	$36\frac{1}{4}$	72	$142\frac{7}{16}$
18	S. Smith ...	White Wyandottes... ...	69	4	$7\frac{7}{16}$		
			70	10	$17\frac{3}{4}$		
			71	10	21		
			72	3	$5\frac{13}{16}$	76	$141\frac{11}{16}$
19	R. W. Hazell ...	Blue Andalusians	74	18	$32\frac{11}{16}$		
			75	17	$30\frac{15}{16}$		
			76	1	$1\frac{15}{16}$	92	$172\frac{1}{4}$
20	Clifford Hoole...	Brown Leghorns	77	5	$8\frac{15}{16}$		
			78	19	$32\frac{5}{8}$		
			79	18	$31\frac{5}{8}$		
			80	17	$30\frac{15}{16}$	124	$219\frac{7}{16}$
21	R. W. Hazell ...	White Wyandottes... ...	81	10	$20\frac{5}{16}$		
			82	4	$8\frac{7}{16}$		
			83	15	$32\frac{1}{2}$		
			84	21	$39\frac{1}{8}$	52	$104\frac{1}{2}$
22	S. Smith ...	White la Bresse	86	4	$6\frac{15}{16}$		
			87	9	$15\frac{3}{16}$		
			88	16	$29\frac{3}{8}$	115	$200\frac{11}{16}$
23	R. J. Williams	Black Minorcas	90	9	$17\frac{7}{16}$		
			91	13	$25\frac{5}{8}$		
			92	5	$9\frac{1}{4}$	27	$52\frac{5}{16}$

BREEDERS' DIRECTORY & FARMING NOTICES.

Advertisements under this heading are inserted at the rate of 30 words for 2s. 6d., (minimum charge) per insertion, and 6d. per line of approximately six words above that number. Payment must accompany Order. Cheques and P.O.O. to be made payable to the CENTRAL NEWS AGENCY 125-127, Long Street, Cape Town, to whom all communications should be addressed.

OSTRICHES.

SPECIALS ONLY.—Choice pairs, 2 years' old, £60 to £100 per pair. Younger birds at lower prices. — F. W. BAKER, Laughing Waters, Willowmore.

OSTRICHES. — Young and old.—For further particulars, apply to Mr. R. S. DE VILLIERS, The Imperial Cold Storage and Supply Co., Ltd., Porterville Road.

PIGS.

PURE BRED BERKSHIRE PIGS.—Prize Winning Stock. Boars and Sows, £3 each. Also Buff Orpington and White Leghorn Poultry. —Apply MANAGER, Maitland River Farm, Green Bushes Hotel, Port Elizabeth.

BERKSHIRE BOARS.—Pure bred. Ages two to fifteen months. Bred by Charles Leonard, Esq. on his well known "Gloria" Estate.—For further particulars, apply to Mr. R. S. DE VILLIERS, The Imperial Cold Storage and Supply Co., Ltd., Porterville Road.

CATTLE.

FRIESLAND BULLS, bred from the best IMPORTED stock, from a few weeks to fifteen months old.—For further particulars, apply to Mr. R. S. DE VILLIERS, The Imperial Cold Storage and Supply Co. Ltd., Porterville Road.

GENERAL.

PASPALUM GRASS PLANTS.—Strong roots per Rail or smaller plants per Post to any address. See larger advertisement, page ix. this Journal.—A. C. BULLER, Dwarsriviers Hoek, Stellenbosch.

Lady, desiring farm life for her husband, who is in poor health (nothing infectious), offers to undertake House, Dairy and Poultry management for a Bachelor Farmer, in return for a home. Can provide linen, cutlery, and part furniture. Interest in stock might be arranged. References required Address: SCRIVENER, Ebden Street, Queenstown.

WANTED

Immediately a Catalonia Donkey, Jack.—Apply to A. BATEMAN, Smithfield, O.R.C., with full particulars of height, age, price, etc.

THE POULTRY YARD.

WHITE LEGHORNS.—Best American Utility Strains. Settings of Eggs for sale, from purebred utility White Leghorns, F.O.R., 10/6 per setting of 15. Cockerels, 10/- to 20/-. Terms, cash with order. Mrs. W. L. STEEL, Stellenbosch.

BUFF ORPINGTONS, SILVER WYANDOTTES, BLACK MINORCAS. Winners of over 90 prizes. Bred for Utility and Show points. Prices from 30/-. COCKERELS from 10/-. Will improve the table and laying qualities of common fowls. Mrs. R. F. DOTT, Kenilworth, Kimberley.

UTILITY AND EXHIBITION Buff Leghorns, Buff Orpingtons, and Houdans. American Utility White Leg and Brown Leg. Cockerels from 10/6, Pullets from 7/6: Eggs 10/6 per setting, unfertiles replaced if returned; day old Chicks from above 18/- per doz. FIRST CROSSES - Houdan-Buff Orpingtons, Houdan-Leghorns, Leghorns-B. Orpington—Eggs 6/- per setting, day old Chicks 10/- per doz. Orders are now being booked for Chicks and Eggs. All Eggs and Birds are packed and put on rail free. Birds not approved of can be returned. All stock is open for inspection at all reasonable times, and this is invited. Cart will meet train upon advice from intending buyers. Terms: Cash with Order.—CARTER & MOLE, Breeders of Utility and Fancy Poultry, Craigneich Poultry Farm, Stellenbosch.

HAZELL, Tregenna, Park Road, Rondebosch. Prize and utility. Andalusians, Brown Leghorns, White and Columbian Wyandottes. Two hundred prizes, including Two Gold Medals and Three Silver Cups. Have pen containing winners last Rosebank Laying Competition. Correspondence invited.

WRIGHT BROS., Highlands, Cape, Breeders of Black and Buff Orpingtons, White and Partridge Wyandottes, Black Langshans and Champion Laying WHITE LEGHORNS. Birds for Sale from 10/6 up. Terms Cash. Birds not approved may be returned. Please Note 400 Birds to select your wants from. Please mention this paper.

BUFF ORPINGTONS. — THE FARMER'S FOWL. The fowl that LAYS WHEN EGGS ARE TOP PRICE. A 1 TABLE BIRDS. My Buffs have unlimited orchard and grass run, and are noted for hardiness and good laying qualities. Young stock always for sale at very reasonable prices Ask for inclusive quotations; carriage paid to any station in South Africa and AT MY RISK to rail destination. My list of prizes won at shows all over South Africa will convince you that this unrivalled *Colonial* strain of 10 years' standing CAN HOLD ITS OWN AGAINST IMPORTED STOCK. Buy hardy Colonial-bred birds and save your pocket. Eggs from purebred utility strain, 12/6. Address: A. C. BULLER, Dwarsriviershoek, Stellenbosch.

FRONTIER CARRIAGE WORKS.

ESTABLISHED 1859.

SCOTT BROS.,

CARRIAGE BUILDERS AND HARNESS MAKERS,

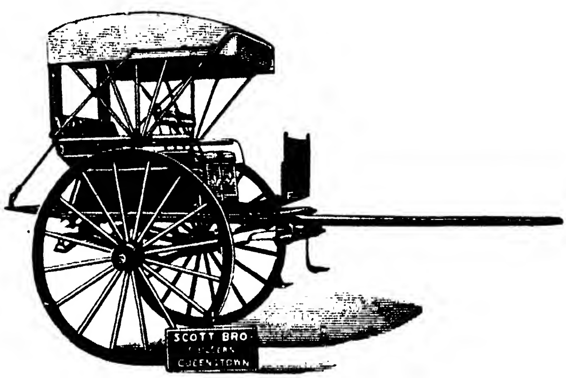
QUEENSTOWN.

Carts, Spiders, Buggies, &c.,
ALSO
Trade Vehicles
of every description.

Rubber Tyres fitted to any Vehicle.

Correspondence invited.

P.O. Box 38.
Telegrams:
"CARRIAGES."



Cable Address: "SELENIUM. P.O. Box 162. Telephone 13.
Codes used: 5th Edition A.B.C., Ager's 3rd Edition, Watkin's A1 Telegraphic Code.

J. G. STEYTLER & Co.

Strand Street, CAPE TOWN,

General Dealers, Importers & Commission Agents,

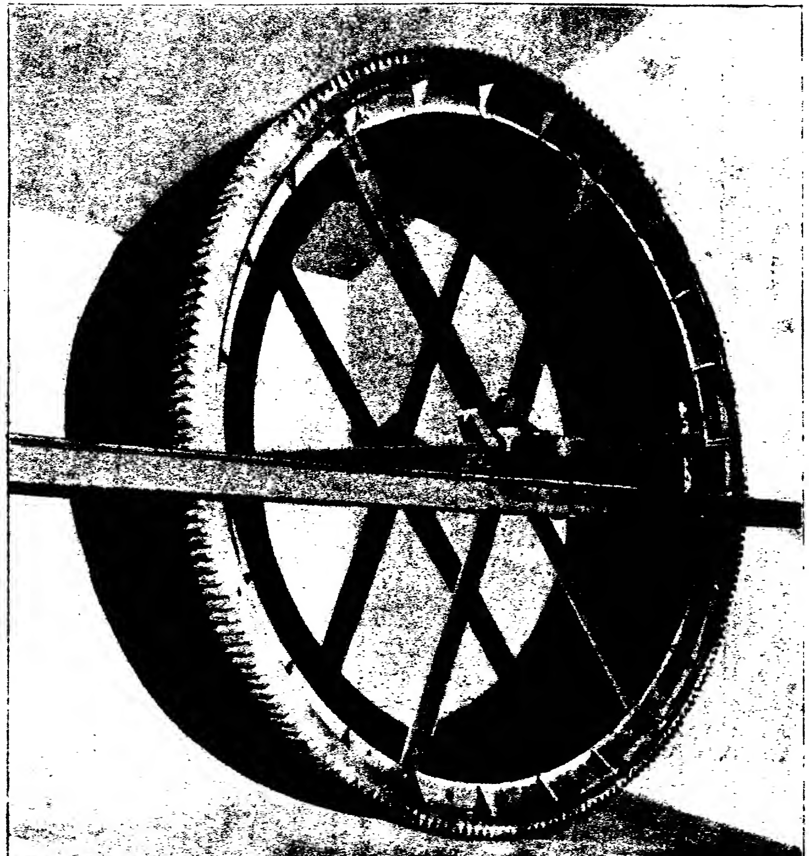
Have always on hand a large supply of Groceries, Provisions and Oilman's Wares.

HARDWARE:
As Galvanised Iron, Hoop, Bar and Stave Iron, Tanks, Wire Netting Spades, Shovels, Forks, etc., etc.

SUNDRIES:
As Hessian Cloth, Cocoa Nut Fibre, Grain and Wool Bags, Ore and Corn Bags, Oil, Turps, Tar, Paints, Brooms, Baskets, Rattans, Wines, Beers, Spirits, Cigars and Cigarettes, Soda Water Bottles, Chemists' and Druggists' Goods, Wagon Material, Colonial and Imported Deals, Floor and Ceiling Material, etc., etc.

Goods in Bond—Terms on application to J. G. STEYTLER & CO.

Head Office: 66-68 Strand Street. Oilman's Stores: (Bond and Duty Paid) Riebeek Street. Bonding Stores: Strand, Castle and Riebeek Streets. Wood and Hardware Stores: Roeland Street. General Stores: Strand and Castle Streets. Timber Store: Maitland.



THE

Agricultural Journal

OF THE CAPE OF GOOD HOPE.

No. 3. SEPTEMBER, 1908. VOL. XXXIII.

Published Monthly in English and Dutch by the Department of Agriculture and distributed gratis to bona fide farmers in the Cape Colony on application through the Resident Magistrate of the District.

SUBSCRIPTION 5s. PER ANNUM. Post Free in South Africa.

Remittances to be made Payable to the Publishers CAPE TIMES, LTD., Church St., Cape Town.

Advertising.—Approved Advertisements are inserted. Full particulars can be obtained from the Sole Advertising Contractors, THE CENTRAL NEWS AGENCY, LTD., 125-127, Long Street, Cape Town—P.O. Box 9—Telephone No. 438—Telegraphic Address: "Periodicals"—to whom also all accounts must be paid.

Postal Address:

The Editor "Agricultural Journal," Department of Agriculture, Cape Town.
Telegraphic Address: "Bulletin," Cape Town.

CONTENTS.

NOTES.

Correspondence with the Department of Agriculture.

With a view to obviating delay in dealing with official correspondence, letters and telegrams relating to matters falling under the administration of the Secretary for Agriculture should in future be addressed by the general public as under :—

I. To the Under Secretary for Agriculture, Cape Town.

Animal Diseases (other than Scab) : General administration of Acts and Regulations.
Cattle Dipping Tanks : Contributions towards construction.
Cattle Dips : Railage.
Bone-meal : do.
Scab Acts : General administration.
Insect Pests and Plant Diseases : General administration of Acts and Regulations.
Wine, Brandy, Whisky and Spirits Act and Regulations.
Beer and Vinegar Act and Regulations.
Fertilisers, Farm Foods, Seeds and Pest Remedies Act and Regulations.
Fisheries.
Agricultural Shows : Grants.
Brands Act.
Fencing Acts.
Destruction of Wild Carnivora.
Destruction of Locusts.
Guano and Sealing : General administration.
Game.
Parks and Gardens : Grants.
Noxious Weeds.
Appointments and changes of Staff.
Tenders.
Publications.

II. To the respective Heads of Branches.

Subjects.	*Heads of Branches.*	*Telegraphic Addresses.*
1. Animal Diseases and detailed administration of Acts and Regulations relating thereto. Stock and Stock-farming.	Chief Veterinary Surgeon, Cape Town.	Veterinus, Cape Town.
2. Insect Pests and Plant Diseases, and detailed administration of Acts and Regulations relating thereto.	Government Entomologist, Cape Town.	Entomologist, Cape Town.
3. Administration of Agricultural College.	Principal, Elsenberg College, Mulder's Vlei.	Ager, Mulder's Vlei.
4. Cereals, Manures, Management of Experiment Stations, Applications for Seeds for trial, etc.	Government Agriculturist, Cape Town.	Agriculturist, Cape Town.
5. Orchards, Pruning and Fruit-growing in general.	Horticultural Assistant, Cape Town.	—
6. "Agricultural Journal" ...	Editor, "Agricultural Journal," Cape Town.	Bulletin, Cape Town.
7. Dairying	Dairy Expert, Queenstown.	Dairy Expert, Queenstown.
8. Wool-sorting, etc.	Govt. Wool Expert, Cape Town.	Govt. Wool Expert, Cape Town.

Subjects.	*Heads of Branches.*	*Telegraphic Addresses.*
9. Bacteriology	Director, Veterinary Laboratory, Grahamstown.	Institute, Grahamstown.
10. Agricultural Co-operation ...	Superintendent, Agricultural Co-operation, Cape Town.	Co-operation, Cape Town.
11. "Groot Constantia," Wine Farm...	Manager, Government Wine Farm, Groot Constantia.	Vitis, Wynberg.
12. Viticulture and Wine-making ...	Director of Agriculture, Cape Town.	Agriculture, Cape Town.

With the exception of the detailed administration of Acts and Regulations which are under the general control of the Under Secretary for Agriculture, the above subjects under this head are under the general control of the Director of Agriculture, to whom correspondence of a general nature bearing on these subjects should be addressed.

Subjects.	*Heads of Branches.*	*Telegraphic Addresses.*
13. Analyses of Soils, Minerals, etc. ...	Senior Analyst, Cape Town.	Neon, Cape Town.
14. Scab Acts: Detailed administration.	Chief Inspector of Sheep, Cape Town.	Acarus, Cape Town
15. Guano and Sealing: Detailed administration.	Superintendent, Government Guano Islands, Cape Town.	

These three subjects are also under the general control of the Under Secretary for Agriculture.

III. (*a*) To the Surveyor-General, Cape Town.

Land Acts and Land matters generally.
Mining Acts and Regulations.

(*b*) To the respective Heads of Branches.

Subjects.	*Heads of Branches.*	*Telegraphic Addresses.*
1. Mines, Kimberley, etc.	Inspector of Mines, Kimberley.	Mines, Kimberley.
2. Claims, Barkly West, etc.... ...	Inspector of Claims, Barkly West.	Claims, Barkly West.
3. Geology	Secretary to the Geological Commission, S.A. Museum, Cape Town.	

These subjects are under the control of the Surveyor-General.

IV. (*a*) To the Chief Conservator of Forests, Cape Town.

General Forest Administration and School of Forestry.

(*b*) To the respective Heads of Branches.

Subjects.	*Heads of Branches.*	*Telegraphic Addresses.*
1. Forests, Western Conservancy ...	Assistant Conservator of Forests.	Forests, Cape Town.
2. Forests, Midland Conservancy ...	Conservator of Forests, Knysna.	Forests, Knysna.
3. Forests, Eastern Conservancy ...	Conservator of Forests, King William's Town.	Forests, King William's Town.
4. Forests, Transkeian Conservancy...	Assistant Conservator of Forests, Umtata.	Forests, Umtata.

These Conservancies are under the general control of the Chief Conservator of Forests.

Infected Potatoes—Transvaal Restrictions.

The Department of Agriculture is informed that a Government Notice has been issued by the Transvaal Department of Agriculture warning importers of seed potatoes that in view of the fact that large quantities of seed potatoes from France and Germany consigned to the Transvaal last season were found affected with the white rot fungus (*Nectria solani* Pers.), it is the intention of that Government to safeguard the interests of local growers by ordering the destruction, or return to the consignor, of all potatoes found infected with this fungus to the extent of one per cent. and upwards.

The "'Tsamma," or Kalahari Melon.

The portion of the Kalahari Desert situated in the Cape Colony between latitudes 24° and 28° South, whilst being far from "flowing with milk and honey," at the same time contains various wild vegetable products capable of sustaining life, writes Sub-Inspector Selby, C.M.P., in a recent report to the Law Department. Chief amongst them is a species of wild melon called by the Hottentots and Bushmen 'Tsamma. The Kalahari proper is quite devoid of surface water, and as yet boring has not been introduced. Rain falls very seldom, although February, March, and April are the months when it is expected, consequently the only water obtainable is from this 'Tsamma, and before explaining how water is thus obtained it would be better to give some idea of the nature and growth of this product. The Kalahari is composed of a series of sand dunes, and these after rains are covered with this water melon which grows on runners similar to pumpkins or cucumbers, or other cultivated vegetables of this species. One plant produces from about 3 to 10 of these melons, which are of a green hue spotted with yellow when young, and changing to a pale yellow when old. This vegetable lasts for some 12 months, and if there have been two consecutive yearly rains in one part of the country, the young green 'Tsamma and the old ones may be seen lying on the ground together. The size of these melons when full grown varies from 6 to 20 inches in circumference.

Water is obtained from the 'Tsamma in the following manner:—The rind is cut off and the melon divided into small pieces and then put into a pot over a fire, whereupon it dissolves, with the exception of the pips and some of the stringy portions of the interior, into a tasteless, rather thick, water. This is strained and then one has a supply of water from which coffee or other beverages can be made. When the 'Tsamma is old and yellow it is found to contain water, apparently the action of the sun's rays having the same effect as the cooking process, and in this state it is most useful as a thirst quencher. A small mouthful sucked from one of these melons, in this state, has a marvellous effect in quenching thirst, equal to a far larger amount of pure water. From the pips of this melon the Hottentots and Bushmen make a kind of meal. The pips are placed on a flat stone and then pounded with a small round stone. This meal has a very oily taste and a fattening effect on the natives. Some 180 miles north of Rietfontein (C.C.) there are Hottentots, together with their sheep and goats, who never see water from one year's end to another, and subsist simply on this melon. The stock of these people, if brought to water, would not drink and would have to be first accustomed to it before using it as a means of sustenance.

In addition to 'Tsamma there is a species of wild cucumber growing in the Kalahari, and this vegetable has also a wonderful property of quenching thirst. The cucumber in question is about 3 inches long by 1½ broad, and has a similar taste to the cultivated vegetable. It seems quite a provision of nature that so waterless a district is provided with vegetable matter to take the place of the essential commodity. To show how useful these vegetables are it may be said that Cape Mounted Police patrols live in the desert for four and six weeks and never taste pure water, camels and men living solely on the 'Tsamma. Of course patrolling in these parts is risky work as the 'Tsamma is found in patches where previous rains have fallen, and it is sometimes a matter of conjecture whether a patrol will strike a patch of 'Tsamma or not. Another vegetable called by the natives 'Naba, is found in the Desert, and this is pure and simply the truffle as known to European palates.

From the foregoing it will be seen that the enormous tract of country shewn on the maps as unsurveyed, and called the Kalahari, possesses natural products which enable the natives to live a life of indolence, nature supplying them with sufficient food to enable them to keep in a thoroughly healthy condition without their cultivating or tilling the ground. The country is sparsely populated and contains a few Bushmen and Hottentots of a nomadic type, otherwise, were they in any numbers, the system of making meal from the pips of the 'Tsamma would in time mean an entire eradication of this wonderful provision of Nature. Game, especially in the northern Kalahari, is plentiful. On a recent patrol through country up to a point some 150 miles north of Rietfontein (C.C.) the writer of this article saw several herds of gemsbok, springbok, and all the species of smaller buck. All these animals exist on 'Tsamma and without water, and their tracks between patches of this vegetable were strongly defined and in some places assumed the proportions of small country roads. All the fauna indigenous to the Kalahari live on 'Tsamma, and the veldmouse is most destructive in this respect, as it invariably eats the pips of the vegetable, thereby destroying any chance of reproduction. Baboons and buck have been observed feeding together on the same patch of 'Tsamma. The whole of the Kalahari lying in Cape Colonial territory is traversed by tri-yearly patrols of the Cape Mounted Police.

The Feeding Uses of 'Tsamma.

Mr. J. F. Herbst, A.R.M., at Rietfontein, gives the following further particulars of the above plant:—Pride of place must of course be given to the 'Tsamma, the very life blood of the Kalahari, without which it would be an absolute desert closed to man. This plant is one of the gourd family, resembling the ordinary water melon plant, except that its leaves are slenderer and smaller. There is no difference at all in growth, but the fruit can easily be distinguished by its shape alone, for 'Tsamma is always either round or spherical, and never grows larger than a very big shaddock. Some are of a dark green colour, others have the stripe like a water melon. There are two species, one tasteless and the other markedly bitter. The Bushman can readily distinguish between them, but the inexperienced have to judge by the taste. The food is exactly like that of the water melon except that it is of a cream colour; the seeds turn to a speckled black when ripe. Upon first acquaintance the fruit has a most insipid taste and exercises a purgative action on the bowels. Only

dire necessity will compel a horse unacquainted with it to partake of it, but once eaten they will always afterwards readily devour it. It should first be cut into small pieces and spread before the animal on a grain bag to protect it from sand. It has a very destructive effect on steel and will blunt the sharpest knife by a few minutes' use. The Bushmen, therefore, operate on it with home-made bone knives. The seeds are set growing by the first summer rains, the plant requiring a shower every week or so while young, to enable it to withstand the hot sun. About two months thereafter the fruit is capable of yielding sufficient water to support life. It bears in great profusion. I have counted over 100 melons on one stalk, and during a good season it is unsafe to gallop a horse through the straate so thickly do they lie on the ground. The first frost kills all the leaves and stalks, and leaves the fruit lying like marbles over the country. After maturity, the fruit remains good for about twelve months, when it dries and the seeds are ready to grow with the first rains of the following summer, so that it reproduces itself only every other season or summer. A good 'Tsamma season is always followed by a poor one, and *vice versa.* The fruit in its raw state is chiefly remarkable for its thirst-quenching properties, but cooked it is also a food for man. The Bushmen have various ways of dealing with it, eating it as a fruit, roasting it under ashes or stewing it with game or vermin (jackals, wild cats, etc.). The seeds are oily and very fattening. They are ground between two stones and made into flour. As a food the 'Tsamma is, however, not very strengthening, and cattle fed thereon soon lose their flesh when worked. To fatten cattle quickly it has no equal, and it was quite a common trick during the recent war in G.S.W.A., where slaughter stock was purchased by weight, to put lean cattle on the 'Tsamma for a few weeks before handing them over.

The Mohair Question—Buyers and Growers.

Jansenville has held a public meeting on the Mohair question, called by the local Chamber of Commerce on the 14th ult. At that meeting Mr. S. Dixon, representing Messrs. Hirsch, Loubser and Co., of Port Elizabeth, delivered an interesting address, in the course of which he said:—The Jansenville district can grow mohair as good as any other part of Cape Colony, but at present its chief weakness in producing mohair is in its want of length and general get up. Just recently Bradford buyers who went to London for the purpose of buying summer firsts had two parcels offered them shipped from Port Elizabeth, and said they preferred Jansenville hair to Steytlerville owing to its freeness from discolour, but it was lacking in length. This was chiefly owing to last season's Steytlerville clip being excessively discoloured. After handling Jansenville mohair for years, he found the chief weaknesses were—not sufficient length and the fault of not keeping rams' fleeces and britch ends and discoloured hair separate from the firsts. This is essential if the district is to compete with other mohair producing centres. Also the summer firsts ought to be grown at least 5 to 6 inches long, and the habit of shearing more than twice a year discontinued. Jansenville firsts are, speaking generally, very well suited for braid yarn purposes, plushes, linings, and upholstering purposes, but when it comes to the supply of yarns for dress goods, the trade requires firsts of better quality, length, and lustre, but more especially the first will have to be attended to if Cape mohair in general is to compete with Turkey mohair. South African breeders will have to strain every nerve before a higher standard of excellence can be reached. What is meant by the word "quality," is generally meant the length or fineness to which a fibre will spin, for the finer or smaller the fibre is, the

longer and smaller it can be spun. Hence they speak of the raw article being 405, 505, or 605, as the case may be. When they speak of 605 quality in wool it simply means that there are 60 hanks, each hank measuring 560 yards and weighing one pound, or in other words there are 33,000 yards of spun yarn of this quality to every one pound weight of material. Such yarns when spun are indeed small, one single pound of 605 yarn reaches 19 miles in length. If mohair growers will bear these facts in mind and apply the same principle to mohair, they will see how important a thing it is to maintain good quality in their flocks.

Why Quality is Wanted.

If mohair-growers were at all conversant with the principles of textile manufacture, they would know that the finer or smaller the yarn, the smarter will be the fabrics into which they enter. It is here that makers of dress goods for women's wear demand the finest classes of yarn that spinners can produce, for they know full well that there is nothing so obnoxious to the feminine taste as coarseness and openness in their wearing apparel, while the finer and smaller the yarns, the more they lend themselves to ornamentation in wearing. It will thus be seen that quality is the first essential in mohair. What the trade wants to-day, and will always want, is first-class stuff; consequently by producing fine long mohair, which is always in better demand than strong short-grown hair, higher prices will be obtained for the clips, and, therefore, they would have more money to spend on first-class goats. In judging mohair *fineness of fibre* ranks first always; for it can be relied upon that where you get fineness of hair you will always have lustre and brightness. The following table will assist in judging your flocks:—

Fineness and character with absence of kemp	25	points.
Evenness of quality all over fleece	15	,,
Lustre, brightness and colour	23	,,
Strength and elasticity of staple	5	,,
Weight.		
Length of staple	20	,,
Density of fleece	6	,,
Evenness and fulness of covering	6	,,
	100	,,

He did not give this table as perfect, but thought it fairly reliable for judging a mohair fleece. If a farmer wished to improve his mohair clip what was necessary was—that he should keep the hair on the goat's back as long as possible. That is to say, when the goats have reached an age when the hair is falling off in fineness and is becoming coarse, then it is time that these goats should be "culled out" of the flock and sold to the butcher. Then again it was necessary that more attention generally should be paid to the preparation of mohair for the market. Numbers of farmers in the district were not at all careful of taking out the locks and britch. These parts are generally coarse and stained, and the elimination of them would increase a clip's value considerably. Also another thing that ought to be general is the packing of rams' fleeces separately; there are a few farmers who do it, but the majority do not, and it creates a bad impression on buyers examining a clip when the bales are sampled up and are on view and seeing some very old rams' fleeces. Most farmers take good care to keep their kids' hair separate, and we ask them to be just as careful to keep their rams' fleeces separate.

Shearing the Angora.

Mr. E. R. Hobson, of Fairview, Aberdeen Road, wrote the following letter, which was read at the same meeting:—

Owing to the drought I am unable to be present at the meeting on the 14th instant. I must thank you for the honour in asking me to speak on the subject of "Shearing Angora Goats"—if you will read this message to the meeting I shall be obliged. I have farmed with Angora goats on my own account for twenty-seven years. I have shorn once a year and twice a year, and I find for the sake of the health of the animals and for the benefit of my own pocket that it is best to shear a 4-months and an 8 months' clip. The first being the "Winter" and the second the "Long Summer." This is for full-grown goats. The Summer hair is sufficiently long to answer all the requirements of the trade, and it is more even, more lustrous and finer than 12 months' hair from full grown goats. With refernce to "Kids," this class of hair should be kept separate, and it should be grown as long as possible, having, of course, regard to the health of the animal, which must not be allowed to suffer if the farmer does not want to become poor himself. I am afraid much of the mischief about short Cape Firsts comes from the practice of selling Winter Kids in England as Firsts, or of having it so described when it reaches England. The complaints about stain in our mohair arise mostly from the practice of kraaling. Let every farmer keep his Angora goats as far away from the kraals as possible when their hair is long. Harshness or rough feel is in a measure due to kraaling and to shearing while heavy N.W. winds are on, or just after. It is always best to shear shortly after a rain, the hair feels better and has more curl. Full grown kapaters' hair should be kept separate. It will pay the farmers to do these things. I have seen a couple of good well-sorted clips this year sell at 1d. per lb. more than badly got-up ones, and as I am afraid we shall see low prices for a couple of years longer, the best got up hair will be saleable when clips not so well got up will be unsaleable. I saw Turkish mohair and Cape mohair side by side in England—the Turkish is a little softer, and it is generally a little finer, but these differences are not great when compared with our best mohair. I think our best mohair is much better in evenness of length, in lustre, and in freedom from kemp. All Turkish mohair that I have seen is very kempy. Our Angoras pay us even now better than the Turkish, as the latter only clips about 3 lbs. of mohair in the year. We clip nearly twice as much including the Winter. I must warn by brother Angora farmers against too much weight. The goat with the heavy fleece, I find, stands a drought badly.

The Goats to Import.

Mr. Dixon also read the following letter from Mr. I. Walley, representative of Mr. John. H. Beaver, mohair spinners, Bingley, Yorks, England:—Dear Mr. Dixon,—Below I give you a few remarks Mr. Beaver has made to me with reference to Cape mohair. He says: "I note that you are using your influence with the mohair growers to improve the quality of the mohair, and as far as possible to avoid kemp. I am glad the farmers are anxious to improve the breed, but should they import Angora Rams from Turkey, they must be very careful in their selection and get them from the best districts, avoiding what is called the "Komah" district. The best Bebazars or Eskischehes have quality, length, and lustre with very little kemp, the Komahs have quality but are badly bred, and contain a good deal of kemp and crossbred hair, and with

almost an absence of lustre, so you can see the necessity of getting the right animals, and whenever you have the opportunity impress this point particularly on the parties interested. Owing to the low quality of Cape Firsts we are compelled to buy Turkey hair for our best qualities, the Cape Firsts being too strong, so they have to be neglected." Several other speakers addressed the meeting.

Sale of Cheese According to Fat Per Cent.

There is a tendency in Germany to do away with the indiscriminate sale of cheese simply as "cheese," and that consumers and retailers propose to demand a guarantee as to the fat percentage in the cheese sold. The Bavarian Dairy Association has registered a wrapper with the words: "Good Algauer Soft Cheese, with at least 30 per cent. fat"—"35 per cent. or "40 per cent." fat, as the case may be—the 30 per cent. labels being brown, the 35 per cent. red and the 40 per cent. blue. The term cream cheese is not used unless there is more than 40 per cent. fat.

This (remarks the *New York Produce Review*) is a step in the right direction; although the quality of a cheese does not depend alone on its richness in fat, it must be conceded that its cost of production depends chiefly on the richness in fat. Of course, there is the element of greater manufacturing expense and greater interest charges for some of the various cheese made, but this is but small when the same kind of cheese sold at the same age is under discussion; hence the justice of some control to protect consumers against the skilful substitution of water for fat.

It is indeed impractical to pass arbitrary laws demanding a fixed percentage of fat for each kind of cheese and hence it seems far more rational for manufacturers of the various kinds to state on their labels the percentage of fat below which they are willing to guarantee that their cheese does not fall. Under our national law there is only a whole milk and a skimmilk class, and it would be more just to permit the substitution of the guaranteed minimum percentage of fat with correspondingly coloured labels for the word "skimmilk" for all the intermediate grades between skimmilk and whole milk.

FARM AND VELD.

Cow's Huge Yield of Milk.

Both the open milking trial and the butter test at the show of the Tunbridge Wells and South-Eastern Counties Society, which has just ended, were won (reports an English paper) by a cow belonging to Messrs. Green Bros., Goring, which gave the astonishing quantity of 77 lb. 12 oz., equivalent to more than seven and a half gallons of milk, during the twenty-four hours. This milk was so rich in fat that the cream after separation produced 3 lb. 9½ oz. of butter. Messrs. Green's cow is a cross-bred brindle about eight years of age, one of her ancestors in all probability having been a Jersey.

Warts on Cattle.

Mr. J. H. Jordaan, of Sterkstroom, writes: —"I would be very pleased if you or any of your readers could give me any information on the following disease. About four months ago I noticed that a calf, about 10 months of age, commenced getting warts on the neck, and notwithstanding all the remedies I applied (as, for instance, sulphate of copper, Little's dip, etc.), the warts gradually increased in size, and are now as big as an ostrich egg, other ones again are smaller. The poor animal now walks with the head bent forward on account of the heavy weight on the throat. It also seems to be a disease which infects, for there are a few other calves on which these warts begin to form." As others have raised the same question, the following notes on the subject by the late Dr. Hutcheon from Vol. VI., No. 1, of this *Journal* are republished for general information.

The Originating Cause.—With respect to warts on animals, the originating cause of these growths on the skin is not very well understood. They are abnormal growths of the papillæ of the skin, and become so prevalent on young cattle on some farms at times, that one cannot help suspecting that there is something contagious connected with their spread. I have seen some young cattle with their heads, necks and fore-quarters literally covered with these warts, of various sizes, some singly, while others would occur in clusters. These young animals present a most unsightly appearance. While the numbers that are sometimes situated around the eye and mouth make it difficult for the affected animal to either see or eat. It is marvellous also how rapidly these warts disappear, without treatment, generally when the animal is between two and three years old.

Treatment.—I do not know of any treatment except either burning them off with strong caustics, such as strong acetic acid, arsenic paste, or Euphorbia milk, as it is called, or cutting them off with a knife or écraseur and searing the root with a hot iron, or sloughing them off by tying a strong fine thread firmly around their necks. If there are only a limited number, they can be very effectively removed by applying a paste made of Cooper's dipping powder. Take a sharp knife and pare off the outer hard crust of the warts until you see the red vascular surface underneath; avoid making them bleed. Then slightly moisten a little Cooper's powder, making it into a paste, and paste this over the surface of the wart. Personally, I apply a little of the pure white arsenic in this manner, moistening my finger and laying on as much of the powder as will stick; one dressing is enough, if properly applied. The warts slough out, the wound or hole can then be dressed with a little strong solution, or if there is a little root remaining apply a little finely powdered bluestone. I would not recommend arsenic to be used in this manner on a large number of warts, absorption might take place through the broken surface and develop the physiological action of the arsenic. If they have a distinct neck they are easily taken off either by ligature or cut off and the root seared. On a large scale, I would recommend paring their surface and dressing them repeatedly with strong acetic acid. Where they are very prevalent, I would recommend isolation of the affected, until we know something more about their originating cause.

Taint in Hams and Bacon.

Mr. Loudon M. Douglas, Lecturer on the Meat Industry, Edinburgh, writes:—Although such vast quantities of hams and bacon are produced, there has been very little attempt to understand the actual processes which occur in the transforming of the fresh pork into the finished article. The process of curing has varied very little for centuries, and the only difference between the present day system and that which was in vogue a century ago, consists in using less salt than formerly; so that whereas cured meats at one time were heavily salted; they are now lightly salted —in order to produce what is called "mild cured bacon" or "mild cured hams." It is a mistake, however, to suppose that the more dissolving of the salt, or any other ingredient which may be placed on the fresh meat, has the effect of "curing" the meat. It has no such effect, but really, only prevents the development of the germs of putrefaction.

In this connection it is interesting to note that the germ which produced taint in meat has been isolated. We are indebted to Dr. Klein for accomplishing this result, and his notes on the subject are of the most interesting character. Dr. Klein states that his examination of the muscular tissues showed that they were more or less discoloured. In very slightly tainted portions, the colour changed to a pale or dirty grey tint, while in strongly tainted portions, the colour approached dirty green, and the microscopic examination of the muscles disclosed the fact that *tyrosine* was present. The origin of this crystalline nitrogenous product is somewhat obscure. It was discovered by Liebig in animal tissues and attributed by him to decomposition of the albuminous substances present. The notable feature is that in the presence of taint, a very powerful and objectionable odour emanates from the various joints.

In the various specimens of tainted meats examined, it was found that a species of microbe predominated everywhere, and, more especially in the parts which were lightly tainted. These microbes exist in the form of cylindrical rods, only visible to the eye by means of a powerful microscope, but the same appearances occur throughout the connective and fatty tissues of the meat, and if the tissues are undisturbed, the rods will present the appearance of being continuous, but very easily get broken up into short segments. This particular microbe which Dr. Klein has named "*Bacillus Fœdans*," is not possessed of the power of moving, such as is characteristic of many other germs, but must rely for its progress on gradual multiplication. This feature, therefore, explains why it aggregates in some parts more than in others. The microbe is incapable of growing freely in the air or if it is exposed to oxygen (*Anærobic*), and it is also incapable of forming spores or seeds and, curious to say also, the ordinary methods of culture of micro-organisms seem to be quite useless in this particular case, inasmuch as the usual media do not seem to support its growth. The principal characteristic, however, of the experiments which have been made, is that while the germ grows in a substance like milk, a most disagreeable odour is emitted. Subcutaneous injections in guinea-pigs did not produce any local or general disease, thus showing that the germ has no injurious effects.

The facts which have been established in these investigations are very helpful in the process of curing. There can be no doubt that the germ is produced in meat from decomposition, which may be set up in several ways. If the meat is insufficiently chilled before the curing agents are used, or if the animals have been slaughtered immediately after a journey in which they have been knocked about, then putrefaction will almost certainly supervene. These germs, however, may be taken up in the cellar itself and, as they are so very small, that some hundreds of thousands of them can rest on the point of a needle, then it will be understood that once they have obtained a location in a cellar, they are apt to remain there.

I am of opinion, however, that the development of taint can be prevented by inhibiting the propagation of these germs by immediately pumping an antiseptic solution into the bacon and hams, and for this purpose I have found that the best antiseptic mixture consists of 55 lbs. of salt, 5 lbs. of saltpetre, and 5 lbs. of dry antiseptic (boric acid). This mixture should be made up to 10 gallons with water, boiled and stirred till clear, then allowed to cool to the same temperature as the cellar. I am familiar with the objections which have been raised to the use of boric acid in any form, but they seem to me to be empirical to a large extent, and not possessing any real virtue—the result, in fact, of mere prejudice. Such an inhibitory solution, if injected into bacon, enables decomposition as it proceeds, to be controlled, until the tissues become saturated with a solution of the curing agents. These curing agents consist generally of salt, saltpetre and a preservative in solution.

I have found in many cellars that the liability to taint is greatest when the atmosphere is in a stagnant condition, and thus liable to encourage the propagation of moulds and similar organisms, and it is in

variably the case that when once taint attacks a cellar it is with the greatest possible difficulty that it can be eradicated without having recourse to strong measures. The remedy is to clear out the cellar, and, after closing up all the apertures, evaporate within it a strong volatile germicide. I have found one or two of these to be highly effective, and when evaporated, they search into the crevices of the cellar, and so destroy any germs which may be lurking there. After this cleansing process has taken place, it is a wise thing to lime-wash the roof and sides of the cellar, and I am inclined to think that this should be done at least once a year, as there is now available a machine which enables lime-washing to be done very rapidly, and I think it ought to form an annual operation in all bacon establishments.

Distribution of Floodwaters in the Karroo.

"Wil. F." writes:—In my communication on the subject of the "Distribution of Floodwaters in the Karroo," which appeared in the March, 1908, issue of the *Agricultural Journal*, I stated that after a river has been in flood, the flow of water ceases "first" at the weir furthest down it, as each weir above is able to take the whole of the diminishing flow. This statement has received contradiction, and instance being pointed out where such is not the case. It was held, therefore, that the upper proprietor had not always the advantage over the lower proprietors, which I maintained they had, and that in consequence it was not necessary that there should be a slight increase in the breadth of the intake at each weir "down" the river. I might here mention that this proposed system is chiefly the result of a close study of the conditions existing on two rivers where many very extensive irrigation works have been constructed, and a vast amount of ground brought under irrigation. Here certainly my observation is quite correct, viz., that the flow ceases first at the weir furthest "down" the river. I admit, however, that a part of this does not always apply, particularly in a case where there are several irrigation weirs on a river at short intervals, followed by a stretch of many miles between the next weir and the one above. The reason in this case that it does not always cease to flow first at the last weir is that the further the weirs are apart the more water there is left between to run off, after it has ceased to flow over the weir above.

It must also be borne in mind that, although the water does not cease to flow first at the last weir, it reaches it later in proportion, and as a large quantity of it will have been taken by the upper farms the flow will be weaker, and consequently slower, and as the flow at each consecutive weir up the river is bound to reach a stage when it can all be taken through a single intake, it will still flow for a shorter period of time at the lower weirs than it does higher up the river. On all our rivers in the Karroo the floodwaters, in most instances, are the result of a sharp thunderstorms of no long duration, in the mountains, and consequently you have a sudden, strong flow in the river, lasting only a little while, and then a steady, gradually decreasing flow as the water continues to drain off the slopes of the mountain after the thunderstorm has passed. More especially, however, should only a small freshet come down, the farmer to whom this lower weir belongs is even at a still greater disadvantage, for several reasons, chief among them the fact that he may get no water at all, as it may all be taken by the farms above for use on their cultivated

lands; this frequently occurs, and even should a fair amount of water flow over the weir above, after a dry season, a large proportion, if not all of it, will be absorbed, owing to the dry state of the river bed and in filling holes.

THE LOWER PROPRIETOR'S CASE.—It was also argued that the lower proprietor had the benefit of a greater number of small sluits flowing into the river. This is no great advantage after all, and will only occur when rain is general, and less water is in consequence required. As too much attention is being paid, and wisely too, to the stopping up of these smaller sluits, this advantage will gradually cease. I hope, for the good of the country, it will cease altogether before much more of our richest soil is carried away. Besides, if we made too much of the benefit derived from these smaller sluits, or made too much allowance for them in regulating the distribution of floodwater from the river, you would have the lower proprietors questioning the right of the upper proprietors in stopping them. It must be remembered, too, that the chief and vastly greater advantage of being on a river is that, as the rainfall on the mountains is greater and more frequent, you often get the benefit of rains which are not local, also the silt deposit from mountains is the richest.

LIMITING INTAKES.—A suggestion made to me is that there should be a maximum limit to the intakes to furrows. After carefully considering, however, I am of opinion that this is neither advisable nor necessary, should my suggested system be adopted, *i.e.*, for regulating the size of the intakes to furrows at each weir in comparison to the extent of land irrigated from it and the amount of ground further "down" the river under irrigation; thus the interests of the lower proprietors are sufficiently safeguarded. This limit would also mean instituting a wrong principle, by debarring a man from making use of all the water he could, should there be little or no ground below him capable of irrigation. In addition to comparative simplicity, this system has these advantages: First, that all weirs I have seen can easily, and at no great expense, be adapted to it, and in case of future development, which is bound to be gradual and irregular, the intakes at each weir can, from time to time, be easily altered, so that if some farmers, owing to lack of funds, or for other reasons, were unable to develop their farms, the rest might in the meantime be making use of the water until it was required. Secondly, that I can see no reason why it should not be applicable to all our rivers, both perennial and intermittent.

THE FLOODING OF VELD.—There is one other suggestion I would like to add to these I have already made—one which I consider very necessary if some such system as I have suggested be adopted for the proper distribution of floodwaters. It is this, that no one should be allowed to utilise the intakes below the crest of the weirs for flooding veld or pasturage after cultivated lands have been irrigated from it (this does not necessarily mean that the same "furrow" may not be used if supplied only with water from the intakes on a level with the crest of the weirs). My reason for this is, that where a farm has extensive cultivated lands, the intake to the furrow will be big in proportion, and in this case should only a freshet come down, it is not more than just that after this farm has finished irrigating its cultivated lands, and there is still a small flow in the river, the

sluice gates to the intakes below the crest of the weirs should be put down and the remainder of the freshet be allowed to go past for the benefit of those lower down the river who also have lands under cultivation.

The Present Lack of Interest.—There is no doubt that irrigation in this country is not progressing as it should do, partly owing to the uncertainty existing in the minds of the farmers as to the exact law governing the subject, but the real and chief reason is, that there is no proper method or system for regulating the proper distribution of the floodwaters of our rivers. The one great difficulty, and point always to be borne in mind in trying to arrive at a satisfactory method of distributing floodwaters, is the fact that the amount of floodwater coming down our rivers always varies, and the only just and fair way, therefore, of distributing floodwaters is the way which places an upper and lower proprietor as nearly as possible on the same footing, no matter what amount of water comes down the river, be it a large quantity or small. As matters stand at present, in many instances the lower proprietors are not able to irrigate their crops nearly so frequently as the upper proprietors can, owing to the upper proprietors utilising the whole of the smaller freshets for flooding veld, and thus taking more than is their reasonable share of such freshets, and in consequence the crops of the lower proprietor frequently fail, which in itself does not tend to encourage those who are not upper proprietors in the spending of money on irrigation and the utilisation of floodwaters. It is high time, therefore, some provision were made for the future to safeguard the interests of those who are spending large sums of money on irrigation at the lower ends of rivers and also to safeguard the interests of the country in general by devising and introducing a uniform method or system of distributing the floodwaters, which will assist and enable irrigation development to expand to its utmost extent, instead of allowing a few upper proprietors to gain a monopoly in floodwaters. The longer we delay the more difficult and expensive it will become to introduce any satisfactory system or method to regulate the proper distribution of the floodwaters.

Diseased Poultry on the Markets.

"Colonist" writes:—I have often wondered why authorities who have charge of markets and the supervision of the public's food supply are so lax in their treatment of sick poultry. From time to time a little stir-up is made, and promises of better things given, but such promises seem to die all too rapidly, and things jog on in the same unsatisfactory style. The farmer, as a rule, is not the one to blame, but the trader and higgler, and I feel confident that those in authority do not realise the serious aspect of the case, or stringent rules would be enforced. Many of the diseases of poultry are of a most unpleasant nature, and it is quite reasonable to suppose that such diseases are distributed throughout the Colonies by the buying up and despatch of birds indiscriminately.

It is also quite feasible that stock and other diseases are likewise distributed by poultry, and it would be a wise move if Government thought out and made some definite move to improve matters.

The following are a few suggestions:—The country and town police should be empowered to seize all unhealthy stock being exposed for sale or conveyed from place to place.

The railway authorities to have like power, and also to see that crates are made with solid tops, as otherwise when crates are packed one on top of another the bottom birds' food and water supply is made very filthy, and birds that were healthy at the commencement of a journey would most probably be very unhealthy after a day or two.

The crates ought also to be thoroughly disinfected after each journey, and the agent to whom birds are sent should be responsible for this. The railway authorities should not accept return empties unless same have been properly cleansed.

Poultry do not receive the attention they ought to, as their value to the country is very great, and it is just as important to prevent the sale of diseased birds as it is of cattle, etc. Farmers ought also to be very careful in buying birds, and see that same are perfectly healthy, otherwise serious loss may ensue.

ARABLE FARMING.

By J. Noble Jack, Director of Agriculture.

To the most casual observer it must be apparent that this is a country in which agricultural economic adjustment has scarcely commenced in any respect. Some land changes hands at £100 per acre, and yields £50 worth of produce in a year. Elsewhere the same sum purchases 100 acres, which will carry five cows, whose grazing is estimated at, and can be secured in many places for, £3 per annum. On this latter class of land five present good cows would give £60 worth of dairy produce. The farmer at present is offered a trifle over ½d. per bottle for his wine, and the retail price of this quantity runs from 1s. to 3s. 6d. For a few months our skilled horticulturists export their best fruit at fancy prices, and for the remainder of the year the consumer pays through the nose for inferior imported stuff. Meat is cheap, bread dear, and the cost of living is much higher all round than it ought to be.

Many reasons might be given for this state of affairs, but, from an agricultural point of view, we are not yet concerned with all of them. The broad lesson to the farmer is to adopt mixed husbandry, but instead of that we find a large majority pursuing one branch only. The cereal grower continues exhausting his already poor soil. The stock farmer, as prices drop, increases his herds and flocks, thus preparing for wholesale slaughter when drought arrives, as he has not yet taken the precautions to grow food for his time of need. Fruit farming is always risky, may fail at any time, and has often failed. Wine production is unremunerative, and even feathers have not always been the gold mine they now are. To reduce the risk of loss to a minimum our husbandmen should, wherever practicable, combine on their farms as many branches of agriculture as they possibly can, though, of course, not all of those mentioned, and there are many parts of the Colony suitable for stock only.

Cereal Production.

The growth of cereals is looked upon as the poor man's occupation the world over, but in view of our present position we can scarcely decline to be regarded poor. Prosperity has been South Africa's ruination; let us hope adversity will prove its salvation. While it is as illegitimate to aspire to enormous profits in farming as in commerce, it is always more damaging to the former, because it tends to limit production and retard the true development of our resources. Accordingly, now that we have got almost to bedrock, we must be content to increase our cereal production, and in this connection it is well to remember that, while bread growing is not very profitable, there is always a demand for breadstuffs. Our consuming power is steadily diminishing, and therewith must go fancy prices for all commodities. The value of our products will be fixed in the world markets, and there are no 100 per cent. profits within the precincts of any corn exchange or in the pens of the great stockyards, and while we have many remunerative side lines in this Colony, the abiding branches are the supply of bread and meat.

For some reason to me inexplicable the growing of wheat has been regarded as almost a hopeless task in this Colony for a very considerable time. According to estimates formed at different times I find that practical farmers reckon the cost of raising wheat at from £3 to £3 12s. per

acre, with an average yield of about 12 bushels. In certain parts of Australia comparable to our Colony twelve years ago the cost was £1 10s. per acre, but this has been reduced, according to the latest figures available, those for 1904 and 1905, to £1 1s. After very carefully considering the matter, I have come to the conclusion that in the West a first year's crop of wheat should be grown on land broken up from bush for £3 18s., and in subsequent years for £2 1s., the figures being made up as follows:—

Table I.—Showing cost of growing one acre of wheat on newly bracked land:—

	£	s.	d.
Clearing land of bush	£2	0	0
Bracking one acre per day	0	4	0
Two Summer cultivations, 5 acres per day	0	1	6
One Spring ploughing, 3 acres per day	0	1	4
Five harrowings, 20 acres per day	0	1	0
One rolling, 8 acres per day	0	0	6
Sowing manure, 12 acres per day	0	0	2
Manure	0	12	0
Half bushel seed and pickling	0	3	6
Drilling seed, 8 acres per day	0	0	6
Reaping and binding, 10 acres per day	0	0	5
Oil, twine, and maintenance	0	0	11
Stooking, 10 acres per day	0	0	2
Carting and stacking	0	1	0
Threshing 4 bags and stacking, etc.	0	1	0
Four grain bags	0	2	0
Rent	0	2	0
Interest on capital (5 per cent.) and 10 per cent. depreciation	0	6	0
	£3	18	0

	£	s.	d.
Yield 4 bags at 16s.	£3	4	0
1,600 lbs. chaff at 1s.	0	16	0
	£4	0	0

Table II.—Showing cost of growing one acre of wheat in subsequent years:—

	£	s.	d.
One Spring ploughing, 2 acres per day	£0	2	0
Five harrowings, 20 acres per day	0	1	0
One rolling, 8 acres per day	0	0	6
Sowing manure, 20 acres per day	0	0	1
Manure	1	0	0
Half bushel seed, and pickling	0	3	6
Drilling seed, 8 acres per day	0	0	6
Reaping and binding, 10 acres per day	0	0	5
Oil, twine, and maintenance	0	0	10
Stooking, 10 acres per day	0	0	2
Carting and stacking	0	1	0
Threshing 4 bags and stacking, etc.	0	1	0
Four grain bags	0	2	0
Rent	0	2	0
Interest on capital (5 per cent.) and 10 per cent. depreciation	0	6	0
	£2	1	0

The tables require some explanation. Clearing the land of bush is an operation which should be necessary only once on land to be used for cereal production and in rotation. The price taken, £2, is actual cost on a Western Province farm where the bush was at least 12 years old. The figure may be much reduced by first burning, then bracking the land and subsequently removing the bush. The work might not be quite so well done, but both relatively and ultimately it would be cheaper. The strict bookkeeper, if he feels inclined, might charge only a proportion of the cost to the first crop, but as it is intended not to allow the land to revert to bush, it is much simpler and quite as accurate in respect of financial results to debit with the full amount the crop on which the expenditure is incurred. Four large or six small mules should easily brack one acre in a day, and their feed in either case would cost 2s., taking the consuming value of oathay on the farm at that price per 100 lbs. The wages of a boy account for the other 2s., and a supply of material and tear and wear are included in the subsequent item of 10 per cent. depreciation. Taking one boy and the same team throughout for the next four operations, the figures require no explanation. The manure is applied by hand, and the boy is regarded as sowing 12 acres a day, whereas he ought to do 20 acres. The seeding is taken for poor soil, and where a greater quantity is used the increased yield will more than balance the extra cost. The remaining items call for no remark except that the average price of grain is a fairly safe one in the Colony, and the yield, in view of the treatment recommended, cannot be regarded as excessive. The profit on the first year is small. In Table II., the 3 acres per diem of bracked land are reduced to 2 for spring ploughing (it would be a little more, and this will compensate for the fraction of a penny taken off manure sowing). The manure bill will be increased by 8s. per acre, and cost of maintenance reduced by 1d., breakages being fewer on old than on new land. The total cost of production would thus be £2 1s. per acre as against £3 18s., and taking the same figures for the returns, the 2s. profit in Table I. becomes £1 19s. in the case of wheat grown on rotation land.

If, instead of wheat, we take oats, and assume a 3,000 lb. crop yielding 45 per cent. of grain, we get:

	£	s.	d.
9 bags oats at 7s. 6d.	£3	7	6
1,650 lbs. straw at 1s. per 100	0	16	6
	£4	4	0

or a financial improvement to the extent of 4s. per acre Oats are worth 5s. per 100 lbs. for consumption on the farm, compared with other foodstuffs, as will be demonstrated in a subsequent article in this series.

Western Conditions.

I have seen many farms in the Western Province where wheat was formerly grown successfully but cannot now be raised at all. Whence the change? Wheat likes what are usually called strong, stiffish clays and loams, and does only moderately in many of our lighter and more sandy soils. The area of ideal wheat lands is therefore comparatively limited, and led to more continuous cropping than would have been otherwise practised. The best of our soils were not, to begin with, by any means what could be pronounced rich, and bed rock was soon reached. The evil day was delayed somewhat by the adoption of the ancient Israelitish fallow, but the expedient, though excellent in many ways, is, to put it mildly, somewhat behind the age now.

Assuming that the straw from, say, one or two crops was consumed by stock or converted into manure by being used as litter, in too many instances this invaluable product of the farmyard was applied to circumscribed areas, and the steady depletion of plant food proceeded apace over the farm as a whole. On farms where fruit trees and vines were grown, the chances are that all the manure found its way into these favoured spots instead of being returned in rotation to the land whence it originally came. Apart altogether from the robbing aspect of this practice, it is an arguable point whether the favourite spots themselves would not be better if they were more moderately treated. Where oats followed wheat which was a very common practice, on account of oats thriving where wheat refused to grow any longer and the bulk of the crop was sold in the pernicious form of oathay, the robbery on the farm was much more serious.

Loss to the Farm.

I would very specially direct the attention of all white crop growers to the following figures. At Elsenburg College, in the harvest of 1907, 100 acres under oats gave an average yield of 4,500 lbs. ripened straw and grain per acre, the variation being from 3,800 to 5,500 lbs. Of the 100 acres, 58 were bracked in the winter of 1906, cultivated and harrowed during the summer, ploughed early and the seed sown broadcast at the rate of 50 lbs. imported Algerian oats per acre. The whole crop was harrowed at least four times and rolled once. The manures used were, at time of sowing:—

50 lbs. Government Guano,
100 lbs. Basic Slag.
20 lbs. Sulphate of Potash,

and a top dressing of:

50 lbs. Nitrate of Soda.

The cost was about 12s. per acre. The remaining 42 acres had carried a white crop in 1906, but were also ploughed early as the soil was loose and open, not having set during the dry preceding summer. The treatment of this area was identical with that of the other, except that 100 lbs. Nitrate of soda were used as a top dressing in two applications, bringing the cost per acre to 15s. 6d. The extra manure equalised matters so that differences in yield were due more to inequality of soil, but, as stated, the average was 4,500 lbs. The yield of grain was 2,000 lbs., and of straw 2,500 lbs., the proportion of straw to grain being thus 45 to 55. If we take these figures and consider the amount of plant food which was carried off per acre, we get the following:—

Table III.—Showing quantities of plant food in lbs. per acre of above crop.

	Nitrogen.	Phosphoric Oxide.	Potash.	Lime.	Ash.
In grain, 2,000 lbs....	42·5	16·2	11·4	2·2	64·0
In straw, 2,500	20·0	7·0	40·0	11·0	152·0
Total per acre	62·5	23·2	51·4	13·2	216·0
Total in 100 acres	6250·	2320·	5140·	1320·	21600·

Neglecting ash and lime, the following quantities of manure would be required to replace the ingredients carried off by the total crop from the 100 acres:—

$14\frac{1}{2}$ tons Government Guano at £6 per ton	=	£87
$9\frac{1}{2}$ tons Nitrate of Soda at £14 per ton	=	£133
5 tons Sulphate of Potash at £13 per ton	=	£65
		£285

whereas, if grain only were sold, the quantities required would be:—

8 tons Government Guano	=	£48 0 0
8 tons Nitrate of Soda	=	112 0 0
$\frac{1}{2}$ ton Sulphate of Potash	=	6 10 0
		£166 10 0

In other words, the cost of maintaining the fertility would be reduced from 57s. per acre to 33s. 4d., assuming that all the loss would be made up by the purchase of artificial manures. To a farmer growing 1,000 acres, the difference between the two sums would mean a substantial income. But this is not all, because, working on our poor soils, if we persist in bad farming, any quantity of artificial fertiliser will not enable us to grow crops at a profit. This point is well illustrated by the results of a continuous experiment in cropping conducted at Elsenburg in 1905, 1906, and 1907 (*vide Agricultural Journal*, April, 1906, and May, 1907).

Table IV.—Showing decrease on unmanured land and land treated with artificials only:—

	Unmanured plot.	Best plot with artificials.
1905	1,239 lbs.	2,988 lbs.
1906	900 ,,	2,400 ,,
1907	650 ,,	1,740 ,,

It will thus be seen that the decrease is almost as rapid on the manured as on the unmanured land, and in the third year it has just got to the verge of being unremunerative.

If these results be compared with those obtained from the use of 16 tons of farmyard manure in 1906 and nothing applied in 1907, the superiority of the natural over the artificial is at once established. We must, therefore, bestir ourselves and adopt mixed farming to convert all roughage on the farm into manure. The direct economic advantages warrant this, apart altogether from the indirect ones of saving of transport, handling, etc.

Table V.—Showing residual value of farmyard manure in the year after application:—

1906.	Yield.	Increase.	Value.
Plot 1. No manure	900 lbs.	—	—
,, 2. 16 tons farmyard manure...	2,900 ,,	2,000 lbs.	80/-
1907.			
Plot 1. No manure	650 lbs.	—	—
,, 2. No manure, but residue of 1906 dressing	2,610 ,,	1,960 lbs.	52/9

Thus the value of the manure in terms of increased produce in two years is 8s. 3d. per ton, and it may be noted in passing that the crop on

this plot was almost ½ ton heavier than that on any other in the experimental area. The season of 1907 was a very dry one, and therefore more favourable to the farmyard manure and less so to the artificials, but this is an argument for rather than against it. A great many of our soils are so deficient in organic matter, and consequently in their power to absorb and retain moisture, that the presence of this sponge-like substance, apart altogether from the plant food it contains, is almost invaluable. All the countries in the world now producing the largest yields, 32 to 42 bushels per acre (as against our 12, and rich prairie soil 20), occupy their position as a result of good mixed farming, and the consequent output of large quantities of stable manure. The effect of this system of farming is so great as to account for the marvellous change that has come over wheat growing in old countries, where four decades ago it was impossible to grow it profitably, whereas this can now be done. The process of amelioration is not, however, one that can be accomplished in a day or a year. Like all agricultural operations, it will require time, energy, and persistent work. It is, nevertheless, well worth trying; in fact, if we are to continue farming at all on our poor soils, it is imperative.

The outlook for the cereal producer is on the whole hopeful, and there is no reason why grain growing should not be as profitable in this Colony as in others similarly circumstanced. In recent years those who have made a special study of the world's food supply have been predicting universal shortage in respect of wheat, and last year was regarded by them as strong proof of what they declare to be approaching. In the Cape Colony we can afford to overlook the world aspect of the question and ruminate over the fact that for the last importing year we paid practically one million sterling for wheat and its products. We must not, however, on that account rush in with wheat on exhausted land. The arable farmer must carry more stock, large and small, and so enrich his impoverished soil as to enable him once more to get a part of the money which is annually leaving our shores.

Our crops, especially, the early sown ones, are promising particularly well at the present time, and every grain-farmer should make up his mind to thresh all. As has been demonstrated in the above, no husbandman, however wealthy, with soil however rich, can afford to dispose of the straw produced on his holding.

The changes hinted at in these few notes are, like all agricultural undertakings, fairly momentous, and should not be adopted without paying due regard to the agricultural conditions here obtaining. A fuller discussion of such questions as rotation, the relation between arable farming and butter, cheese, beef, mutton, and pork production will appear in a subsequent issue of the *Journal*.

POWER PUMPING FOR IRRIGATION PURPOSES

SOME PRACTICAL NOTES ON THE WORKING OF STEAM, OIL, AND SUCTION GAS ENGINES, TOGETHER WITH SOME BRIEF NOTES ON PUMPS DRIVEN BY SUCH ENGINES FOR IRRIGATION PURPOSES.

(Paper read by Mr. R. W. Newman, of the Irrigation Department, at the Vacation Courses in Agriculture at the Rhodes University College, Grahamstown.)

In dealing with the above subjects, I propose to keep to the practical side of the selection and use of the above classes of machinery, noting the defects which may develop and points which farmers should be careful about in working them. To make various matters clear it will be necessary at times to refer to theoretical points, but these will only be briefly mentioned.

Steam Engines.

The steam engine and boiler in various form is familiar to you all; those used by farmers are generally stationary or fixed engines, either with the boiler and engine independent, or semi-portable, the latter being mounted on wheels to enable them to be moved from point to point as may be desired. The first thing a farmer has to consider is what size of engine he requires. Here possibly his difficulties commence; he will hear the terms "Nominal Horse-power," "Brake Horse-power," "Indicated Horse-power," "Effective Horse-power," "Working Load," etc. It has been the practice to sell steam engines in terms of their "Nominal Horse-power"; oil engines are sold by their "Brake Horse-power," and for expressing the size of gas engines the latter term is a usual one, though the term "Effective Horse-power" is often mentioned. First, let us consider what a horse-power is; then, having got a clear understanding as to what the horse-power depends upon, you will be better able to distinguish between the above terms. All work can be converted into foot-lbs., which is the product of pounds raised through distance measured in feet against the action of gravity: Thus, the work done in raising a weight of 100 lbs. through a vertical height of 1 foot is 100 foot-lbs., the same amount of work being done in raising 1 lb. through a vertical height of 100 feet.

One horse-power is the work done in raising 33,000 lbs. one foot high in one minute. You will notice that time (one minute) is a factor in determining horse-power. To make the matter clearer, let us look at the question from the point of view of the work done in raising water; it will take (theoretically) 1 horse-power to raise 33,000 lbs. of water one foot high in one minute, and 2 horse-power to raise 33,000 lbs. of water 2 feet high in one minute. Again, as a gallon of water weighs 10 lbs., we can

express the power required in terms of gallons; it will take 1 horse-power to raise 3,300 gallons one foot high in one minute (theoretically), and 2 horse-power to raise the same quantity through twice the height in the same time.

The power of an engine depends on various factors:—

1. Boiler pressure in steam engines. Pressure caused by explosion in oil and gas engines.
2. Area of the piston.
3. Number of impulses or working strokes per minute or speed.
4. Length of stroke of the piston, which is kept constant by the dimensions of the crank.

In the case of a steam engine 1 and 3 can be varied; thus the boiler pressure can be lowered by not keeping up the fire, or the throttle valve which controls the supply of steam between the boiler and engine can be partially closed, in which case the speed will be reduced and at the same time the horse-power.

Nominal Horse-power is a term which ought to be obsolete; it does not convey any idea of the power which can be obtained from the engine, thus you will find that the nominal horse-power in some makers' catalogues is given as, say, 10 and alongside you will find, effective horse-power 30. I strongly recommend you never to be led away by such statements, they were probably obtained with skilled firemen, with the best coal obtainable; certainly not under continuous work in this country with unskilled labour, and with green timber or "mest," which you are largely dependent upon for fuel.

Brake Horse-power is the power available for work, to drive your pump, etc., it does not include the work required to drive the engine itself; this is what you must base your terms of purchase upon, or better still, base them upon the delivery of a certain number of gallons of water delivered to a pre-determined height on continuous running of 10 hours daily.

Indicated Horse-power is a term which you would be well advised to leave to engineers, it requires considerable technical knowledge to obtain this, and it is a term which will only tend to confuse you.

Effective Horse-power is practically the same as Brake horse-power. I can best describe it by considering the case of an engine which gives 20 Brake Horse-power. A maker might say that this would represent 18 effective horse-power, meaning that, for instance, owing to the fire not having been kept clear in the case of a steam engine, you could only rely on 18 Brake horse-power.

Before passing on to the question of the maintenance of machinery, let me say that on no account should you buy an engine with too small a margin of power, *i.e.*, one that has all it can do to carry its load; you would not think of putting twelve oxen in a wagon which they could just comfortably pull along a level road when fresh, and expect them to pull the wagon out of a sluit when they are tired, I presume you would rather put eighteen in the span; your twelve oxen would be spoiled, whereas eighteen would arrive fresh at the end of the journey; an engine is in a worse position than the oxen, as parts wear in time and reduce the power.

Again you will recollect that the horse-power depends on the boiler pressure, so that your boiler and its fire-box must be large enough to produce sufficient steam under the worst conditions which are likely to arise. All boilers for use in this country should have an extra large fire box or furnace in view of the inferior fuel in common use.

Every maker of repute who is represented by agents in this country —and the agents also—will give you ample power, if you are prepared to

pay for it; but if you will cut down their price they will cut down the power. From an extensive experience of engines on farms, I do not hesitate to say that many pumping plants have not proved successful because the pumps have not sufficient power behind them, when slight wear takes place in the engine the supply of water falls off and the owner gets disgusted—often, I fear, through his own fault, though he would not be human if he admitted it.

Starting a Steam Plant.

Now let us assume that your engine and boiler has arrived—being of ample power—nicely painted and looking very smart; how long will it remain so? and let us pass on to consider its future career and the difficulties which will arise in actual daily work.

The engine should be put in a shed, large enough to allow a space of 4 ft. all round it, the shed being fitted with windows or shutters, so that it may be well lighted, as by this means defects and dirt will be more readily seen. The floor of the shed may with advantage be concreted, but in any case the portion under the fire box and for a space of 3 feet before and behind should be so covered, so that the process of blowing down the boiler may be properly conducted and the water led off by suitable channels instead of blowing holes in the floor. Room should be left fore and aft for working the firing tools, and the tube brush.

Before getting up steam, the boiler should be filled with water to the level of the middle of the gauge glass, the fire lighted and allowed to burn gradually until steam is raised in from 1 to 1½ hours. Never press the fire at this stage, remembering that the whole machine has to be raised from the temperature of cold water to that of the working pressure of the steam. I doubt not that if many boilers could speak they would tell their owners that they were suffering from internal strains due to neglect of this precaution.

Here let me remark that makers issue a sheet of instruction for the guidance of engine attendants, these are not sent out to light the fire with but to be put up in the engine-room for reference. Another point which is often overlooked is that a boiler takes longer to warm up on a cold morning than on a warm one, so that you will gain something in erecting a shed and will save fuel.

Again makers supply spare parts, which should be carefully stored away, also spanners, which should be put on a rack in the engine-room. These spanners were not supplied for use on the farm ploughs, for which doubtless you have purchased other spanners.

The next step is to oil your engine while steam is being raised. The quality of oil should be considered. I have often heard the remark, "My engine takes two bottles of oil daily." Better by far that it should take one bottle of *good* oil than two bottles of oil bought because it is cheap. It is possible to give a horse so much bad food that it will be wasted, your engine oil will also be wasted if it is not good. Now open the cylinder drain cocks because directly the hot steam comes in contact with the cold cylinder and piston it is reconverted into water, and this must be allowed to escape, or it may be the means of your cylinder covers being broken. When the engine has been running for ½ minute, the drain cocks should be shut and you are fairly started on the day's run.

The mechanic who has erected the plant will have left everything ready for work, including a tank from which water will be pumped into the boiler. Adjust the supply valve so that the amount of water keeps steady in the gauge glass; do not put a lot of water in at once and then not let any in for some time, or you will affect the steam supply. From

time to time see that the gauge glass is shewing the true water level by opening the test cocks.

From time to time, preferably at meal times, the engines should be oiled round. You can at the same time see if anything requires attention, but while the engine is standing do not open the fire door fully and let cold air into the fire box. It is not fair to it, you chill the tube ends which will leak, and you will strain the fire box. The proper plan is to shut down the damper on the ash pan and open the door a very little way.

It is a popular impression that *anyone* can fire a boiler; this they cannot do, but any sensible person can. A good deal of trouble will arise possibly from your fire bars; you may not be able to get enough air through to support combustion, or your bars may melt and bend. Did you inform the maker that you were going to burn "mest" for fuel? If not, he may have supplied you with bars for coal or wood. "Mest" requires a greater space between the bars.

I mentioned above that the engine requires oil, but the boiler should be kept free from oil. It is a common practice to lead the exhaust steam into the boiler feed water. With it will pass any excessive oil which has been used in the cylinders. Oil eats away the boiler tubes and pits the shell. It can be counteracted to a limited extent by putting caustic soda and other materials in the water, but the best plan is to avoid getting oil into the boiler at all. Another way in which oil gets into the water is by allowing the drippings off the engine to get into the feed tank; this must not be allowed.

Where the piston rod and slide valve spindle work in and out, there is a gland which has packing behind it to prevent the escape of steam. In time this packing wears away and the glands will need to be tightened up. This should be done by tightening each nut by the same amount. Eventually your packing will have to be renewed; rope and yarn will not do for this, you must get proper asbestos or other suitable packing, or you will invite trouble and loss of steam.

If you examine the brasses of a new engine you will find them set close together, or with a liner between, in time they will wear and will require bringing together again. Unless you thoroughly understand such work, you should call in the aid of a mechanic; many a good engine has been ruined by an amateur trying his hand at this work.

In the case of many engines the exhaust steam is passed up the chimney to make a draught for the fire; a certain amount of this will condense and fall into the smoke box, also if it rains water from this source will come down the chimney and, falling among the ashes, set up rusting in the iron plates of the smoke box. To avoid this the smoke box should have all ashes removed after each day's run. A layer of concrete through which a small drain hole has been made, should be formed in the smoke box when the engine is new. The ashes will not rust the concrete, which again protects the plates from injury.

Great care should be taken to use clean pure water for the boiler. The boiler will also require washing out from time to time. It is also a good plan just before stopping for the night to add a little extra water to the boiler, say, up to the top of the gauge glass and then blow it down through the cocks provided for the purpose to the middle of the glass, having first allowed the pressure to fall somewhat.

If the engine is not to be used for some time, the boiler should be emptied, or filled full to the top on the following day through the safety valve opening; this prevents the tendency to corrode away the plates at the water line, 'twixt air and water.

Having stopped for the night, open the drain cocks on the cylinders, take out the fire and blow down the boiler; open the smoke box door and

sweep out the tubes; clear all ashes out of the smoke box, then wipe down the engine and boiler, remembering that oil comes off more readily when everything is warm.

Few farm engines ever wear out, they do not work every day as a rule, nearly all I have seen past work have ended a brief career through *neglect*.

Before passing on to the consideration of oil engines, it may be well to explain that the steam engine works by admitting steam alternately to either side of a piston or pistons; such an engine is termed double-acting. I have purposely refrained from going into details of construction, but these I will explain to you at a demonstration on an actual engine later.

Oil Engines.

I have just mentioned that steam engines are double-acting; oil and gas engines work in a different manner, they are with few exceptions single acting, that is, they only receive their power on one side of a piston. They also differ from steam engines in that they are arranged to run at a pre-determined speed, so that the horse-power cannot be varied by altering the speed, nor can it be varied by altering the pressure, so that it is generally controlled by varying the proportions of oil in the charge or by supplying more or less charges of oil as may be required. This is usually done by cutting out charges by means of a governor.

The action of oil engines is as follows:—On the first outward stroke of the piston a charge of air and oil is drawn in, on the return stroke this is compressed behind the piston; just after the next stroke is commenced the charge is fired, and gives momentum enough to drive the machine or pump, and carry the engine through two more revolutions. It is for this reason that the fly-wheels of oil engines are made so much heavier than for a similar size of steam engine. On the fourth stroke, when the piston returns, the exhaust is driven out of the cylinder; this cycle being continually repeated.

If it is necessary to keep a steam engine clean, it is more than ever necessary to keep the oil engine in no worse condition. My previous remarks on housing will apply to any type of engine.

To start an oil engine, the lamp which heats the vaporiser will first be lighted, and while it is warming up the engine may be oiled round. When the engine is first started it will have to be pulled round by hand unless some starting device has been supplied, care being taken that the vaporiser is sufficiently hot to fire the explosive charge of oil and air.

Some engines have to have a lamp always burning, others again conserve enough heat to fire the charge: it entirely depends on the make. Much can be said in favour of each pattern. Personally, I think that there are advantages in each which outweigh the reputed disadvantages.

The chief difficulties with oil engines occur from one or more of the following:—

Vaporiser and heating tube not being sufficiently hot. This defect points out at the same time its obvious remedy.

Too much oil or too little air. This is a matter of adjustment, which practice will soon correct.

Not sufficient compression. This will result in the engine not maintaining its speed. The defect must be looked for in the valves or piston. The valves may require grinding so that they do not leak, and a little fine emery or broken glass will soon work a fresh face on both valve and seat. When grinding the valves they must not be worked backward and forward, but a continuous circular motion must be maintained, or the faces will not be true all round.

Having made the valves tight, take a candle and hold it in front of the piston; let someone else pull sharply on the flywheel, so as to compress the air behind the piston. If the rings are defective, air will escape past the piston and blow the flame of the candle over. To put in a new ring you must uncouple the connecting rod end and carefully withdraw the piston on to wood blocks laid in the engine bed. From this point it can be lifted on to the floor. Set it up on end, when you can remove the rings by inserting pieces of thin sheet iron—say, four in number—about ¾ inch wide under each ring, and slide the rings off. The ring nearest the vaporiser will generally give out first; it is exposed to a higher temperature than the others, and will consequently require renewing oftener. Before replacing the rings the piston and all rings should have every trace of carbon deposit removed from them; they can then be replaced in the same manner that they were removed, care being taken to see that the ends fit against the studs. In replacing the piston the studs must be put towards the bottom of the cylinder; when the piston is "home" it must be turned round so that the studs are on the top.

One, and that possibly in the majority of instances in this country, the only cause of piston rings giving out soon is the use of improper oil for lubricating the cylinder. Owing to the high temperature of the explosion, ordinary oils become carbonised, leaving a deposit in the cylinder and round the piston rings, which causes friction, and may break the rings. A special oil or castor oil must be used for cylinder lubrication. Before passing on to other defects, let me warn you when grinding valves in to be sure that you remove all trace of emery or glass before putting on the covers, otherwise this material will find its way into the cylinder and cause infinite mischief.

An engine may stop running, owing to too small a supply of oil. The vaporiser injection passage may have got blocked—it is only large enough to get a small needle through—or the pump gland may be leaking, and therefore not delivering its full charge. Points of this nature a little practice will enable you to locate and remedy.

There are many minor matters which will have to be considered: the adjustment of the lamp to give the best temperature, the amount of water allowed to circulate round the jacket, etc.

One thing I would particularly warn you about, and that is not to be continually interfering with the permanent adjustments made by the makers. Study your engine, understand every detail; later you may be able to make adjustments which will improve the running, but I think that it is more probable that in those days you will be glad to leave "well alone."

A great deal can be learned by watching the exhaust pipe; it should give an almost colourless vapour. You will perhaps notice black smoke; this is due to incomplete combustion, from loss of compression, defective air supply, too much oil, vaporiser too cool, etc.

Bumping and knocking noises will be heard, and practice will only guide you to their location. They may be caused by loose bearings, defects in the compression or time of ignition; they do not generally indicate anything seriously wrong, but the warning they give should not be neglected.

The consumption of oil for driving the engines will amount to about ¾ pint per horse-power per hour. It is an excellent plan to note the amount of oil used both for working the engine and for lubrication. This can best be done by noting the time and date when the tank is filled, and dividing the amount of oil by the number of hours run; the same method may be adopted with the lubricating oil; you will be surprised at what you will learn in this manner.

The circulating water must be clean, otherwise it will block the passages; it should be so regulated that the temperature of discharge is about 150° Fahr. If frost occurs during the winter the water should be shut off when the engine stops running, and the jacket drained, as if the water in the jacket freezes it will burst the casing.

Suction Gas Engines.

The use of suction gas plants is rapidly growing, and their advantages over steam and oil engines make them undoubtedly the power of the future where isolated plants are required.

In this Colony they have been used for some three years, but only so far on a limited scale, chiefly because those who would use them look upon a new power with a certain amount of suspicion. Only a few days ago I was seriously told that they were dangerous, and on inquiring the reason I was informed that a native had got "gassed" (he soon came round). All I can say is that if a native or anyone else will put his nose where it can inhale gas he must expect to get "gassed." He no doubt enjoyed the temporary loss of consciousness. One thing engineers have never been able to do is to make machinery "fool-proof." You may look upon many such stories you will hear about this new power as being, like Mark Twain wrote to the editor of the paper which published his obituary notice, "greatly exaggerated."

The great feature of a suction gas plant is the low cost of fuel. Whereas the ordinary steam engine in use on farms will burn some 5 lbs. of coal per horse-power per hour, the new power only uses about 1¼ lbs., or if charcoal, which can be made on your farms for 6d. per 100 lbs. from any of the well-known woods, as Mimosa, Kameeldoorn, etc., is used, the consumption only amounts to 1½ lbs. per horse-power hour. In other words, you can obtain 10 horse-power for six hours for the expenditure on fuel of less than 6d. Assuming that your oil costs only 1s. per gallon, the same power will cost you 5s. 8d.

A suction gas plant consists of a generator, scrubber, expansion chamber, and the engine.

The generator consists briefly of a furnace, having a fire brick lining, with a space above the furnace which holds water heated by the furnace. The engine in drawing its supply of air and gas takes this from above the fire, the furnace doors being closed and a connection being made with the water space above. The water mentioned previously is also in direct communication with the atmosphere.

As each change of gas is drawn by the engine a fresh supply of air is drawn in, which, passing over the water, carries off a certain amount of water, vapour, and steam, this being drawn up through the fire causes the oxygen to combine with the carbon in the fuel to form carbon monoxide gas. Hydrogen gas is also decomposed from the steam and nitrogen from the air. A typical analysis of the gas is as follows:—

Co_2	Carbonic Acid	5·8%
O	Oxygen	1·3
C^2o	Carbonic Oxide	19·8
H	Hydrogen	15·1
C^2H_4	Marsh Gas	1·3
N	Nitrogen	56·7
		100·00

To get the best effect it is necessary to obtain certain proportions of these gases, much the same as the proportions of oil and air in an oil engine.

Fuel is fed from time to time through the hopper at the top. Anthracite coal, coke, or charcoal are the best fuels, owing to their freedom from tarry matter, which is present in large quantities in the ordinary bituminous coal, and to get rid of which it is necessary to add a purifier or other device to arrest this, which would otherwise find its way into the cylinder of the engine.

From the generator the gas passes into the bottom of the scrubber, which consists of a vessel filled with pieces of coke about 6 inches in diameter. As the gas passes up through the scrubber it is washed with a water spray, and all particles of dust and other objectionable matter are removed into the siphon box. From the scrubber the gas passes to the expansion chamber, which is simply an enlargement on the pipe to equalise the draught on the producer, and thence to the engine.

I do not propose to go into the many points in connection with the working, such as the arrangement of valves when lighting up; suffice it to say that the remarks on oil engines apply, except that you are dealing with gas instead of oil; with one exception, instead of using a lamp to heat the vaporiser, an electric device is used, and the gas is fired by an electric spark.

Anyone who can run an oil engine should by careful attention to the instructions issued by the makers be able to work a suction gas plant. One great feature, apart from the saving in fuel, in these plants is that there is no boiler to explode, which is a danger which I fear is not sufficiently appreciated by many boiler owners.

To start the producer certain valves and doors are opened, and the fire is brought up to its proper temperature by means of a fan, which has to be worked by hand for about twenty minutes, or until by trial at the test cocks it is found that suitable gas is being made.

It is essential that the supply of water to the producer and scrubber should be clean and free from sediment, which would otherwise block the pipes and the coke in the scrubber. The amount of water required is about 3 gallons per horse-power per hour.

Pumps.

Passing to the question of pumps used for irrigation work, driven by either steam, oil, or gas engines, these can be divided broadly into two classes: "Centrifugal" and "Plunger."

Centrifugal pumps may again be divided into many sub-divisions: low lift, suitable for heads up to 35 feet; high lift, for heads from 35 to 100 feet; and compound pumps, which will deliver up to almost any height which may be required in practice. It should, however, be borne in mind that approximately twice the power is required for twice the lift, and that the greater the lift the greater the first cost of the pump.

A low lift pump should never be put down where the lift exceeds 35 feet; the speed at which it has to run for the higher lift will soon wear it out, and its efficiency falls off. The efficiency is the ratio of the amount of work put in, to the effective work got out of a pump or other machine. Thus centrifugal pumps have an efficiency of from 55 to 80 per cent., which, expressed in other words, means that if you put in 100 horse-power of work you obtain from 55 to 80 horse-power out, represented by the number of foot lbs. of water delivered divided by 33,000.

Plunger pumps may be divided into many classes, such as the solid single acting ram, the double or single acting plunger, etc. They all work by a to and fro motion, imparted by a crank or cranks; thus a single plunger would have one crank and a treble plunger three. Their efficiency varies from 65 to 85 per cent.

There are various points which must always be borne in mind, and which are common to all pumps. The suction must have as short and direct a vertical lift as possible. All joints in the suction pipe must be absolutely air tight. The foot valve must fall readily on its seat. All glands must be kept well packed, not with hard asbestos packing, which is only suitable for high temperatures, but with soft, yielding grease packing, which will exclude all air without putting undue friction upon the spindle or plunger. The pump must be get-at-able, and not cramped for room, as if it was of no consideration. A reflux valve with bye-pass should always be fixed above the pump, and ample provision should be made for lubricating all working parts, which should also be well protected from the sand and dust which are in such frequent evidence in this Colony.

Finally, you should be careful to avoid air locks in your pipes. Such a thing as a high point in the suction pipe is fatal, and an air lock in the delivery pipe only throws useless work on your pipe. Pipes, both suction and delivery, should be of ample area. The pump cannot deliver the water which is in the river if it cannot get hold of it, nor can it discharge its water through long and confined spaces with the same power which it could through pipes of ample area, put down probably with the idea of saving initial expense.

In conclusion, let me beg of you to give the same care and attention to your machinery that you do to your horse. I am certain that when pumps and machinery are looked upon with this care, we shall see irrigation vastly extended by their use, if the water, which must be always dear water compared with furrow water, is used in the most economical manner. The looking after and working of machinery is not Kafir's work; it is that of an intelligent white man, of whom there is an ample supply in this country at the present time.

ANIMAL DISEASES—CONTAGIOUS AND INFECTIOUS.

Summary of Outbreaks of Contagious and Infectious Animal Diseases Scheduled under Act No. 27 of 1893.

Still under Quarantine on 31st July, 1908.

District.	Lungsickness.	Redwater.	Tuberculosis.	Anthrax.	Glanders.	Sponsziekte.	Mange.	Epizootic Lymphangitis.	Totals.
Albany	...	...	...	1	...	...	...	...	1
Alexandria	...	...	3	...	...	1	...	...	1
Cape	...	...	...	...	...	...	...	...	3
Clanwilliam	...	...	...	...	...	...	1	...	1
East London	7	...	...	1	...	6	...	...	14
Gordonia	5	...	...	...	...	...	...	...	6
Hay	1	...	...	...	...	...	...	...	1
Herschel	...	...	...	...	...	3	...	...	3
Humansdorp	...	6	...	...	...	5	6	2	19
Kimberley	...	...	...	...	...	1	...	...	1
King William's Town	9	...	...	...	...	2	...	...	11
Komgha	4	...	...	2	...	1	1	...	8
Mafeking	...	...	...	...	...	1	...	...	1
Paarl	...	...	...	...	2	...	...	...	2
Peddie	1	...	...	...	...	...	...	...	1
Queenstown	...	...	...	...	...	2	...	...	2
Stockenstrom	...	...	...	...	...	1	...	...	1
Stutterheim	1	...	...	...	...	...	...	...	1
Vryburg	1	...	...	...	...	...	...	...	1
Tembuland.									
Umtata	45	...	...	...	...	...	...	...	45
Engcobo	21	...	...	...	...	...	...	...	21
St. Mark's	2	3	...	...	1	3	...	...	11
Mqanduli	27	...	...	...	...	1	...	...	28
Elliotdale	1	...	...	...	...	...	...	...	1
Transkei.									
Butterworth	13	...	...	2	...	...	...	...	15
Kentani	24	...	...	1	...	5	...	...	31
Nqamakwe	19	...	...	...	...	...	1	...	20
Tsomo	6	4	...	...	...	...	...	...	10
Idutywa	...	...	...	...	...	1	...	...	1
Willowvale	12	...	...	...	...	...	...	...	12
Pondoland.									
Libode	2	...	...	...	...	...	...	...	2
Ngqeleni	7	...	...	...	...	...	...	...	7
Lusikisiki	2	...	...	...	...	...	...	...	2
Flagstaff	1	...	...	...	...	...	...	...	1
Tabankulu	29	...	...	...	...	...	1	...	30
East Griqualand.									
Mount Ayliff	1	...	...	...	...	...	...	...	1
Umzimkulu	...	...	...	...	...	1	...	...	1
Qumbu	29	...	...	...	...	...	...	...	39
Tsolo	39	...	...	...	...	...	...	...	39
Mount Frere	15	...	...	...	...	...	...	...	16
Totals	326	13	3	7	3	37	10	2	401

GEORGE ROWE, pro Chief Veterinary Surgeon.

Office of the Chief Veterinary Surgeon,
Cape Town, 5th September, 1908.

SOUTH AFRICAN BEE-KEEPING.

By H. L. Attridge, F.R.Inst.Soc.

(Lecturer at the late Agricultural Schools at Stellenbosch and Somerset East, and Apicultural Adviser to the Department of Agriculture.)

(*Continued from p. 170.*)

CHAPTER XVII.

After Swarms or Casts.

As previously stated, the first swarm usually leaves the hive about the time the cells containing queen larvæ are sealed over. In seven or eight days after, varying with the temperature, the most advanced queen hatches out. Should the workers decide to send off a second swarm, they keep guard over the remaining cells to prevent the first hatched from destroying her prospective rivals.

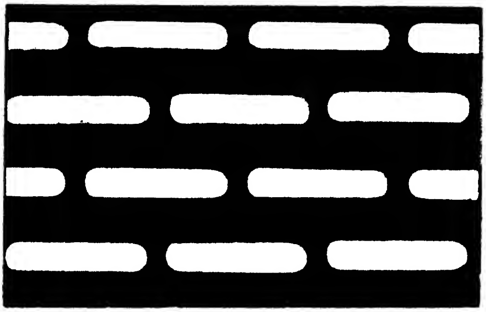
"*Piping.*"—By carefully listening with the ear placed close against the hive during the quiet of the evening about this time, the "piping" of the queens may be distinguished above the usual hum of the hive. The tones are variously pitched and sounds like "peep," "peep," "peep." On hearing the "piping," the bee-keeper may know that a second swarm, or "cast," as it is often called, will issue during the next day or two. Two or more queens may leave with the second swarm, and even third and fourth swarms may be thrown off at intervals of one or two days. These after swarms are often a great deal of trouble. They generally settle further from the hive, and if accompanied by several young queens, may collect in distinct clusters; while not infrequently they *trek* altogether.

Second swarms may be utilised when increase of stock is wanted; but all subsequent swarms should be prevented or hived together, when only one queen will be allowed to survive.

If the stock hive is allowed to proceed upon the above lines a considerable depletion of the population will result, to say nothing of the anxiety and trouble to the bee-keeper.

To prevent this state of affairs, the following plan may be adopted. After the first swarm has left, examine the combs of the stock hive, and cut out all queen cells *but one*, selecting the largest to remain. Be careful in this operation, and on no account injure the remaining cell in any way. By this method there will be no second swarm. One queen will mature in due course, and become the mother of the future population. The hive should be examined about 18 days after to ascertain the presence of the queen after mating, and to note if she has commenced to lay. Occasionally a queen is lost on her wedding tour. If this proves to be the case, or

from any other cause the queen is not seen, a test may be made by placing a comb containing eggs and young larvae in the brood nest, and watching for new queen cells. Although the queen may not be seen at the first examination, but eggs and young brood are found uniformly distributed, it may be inferred that the queen is there, and the condition of the brood in a few days will verify this conjecture. Much waste of time will be prevented if instead of allowing them to take the above course, all queen cells are destroyed and a laying queen introduced as will be explained later



Queen Excluder.

Another method is practised with the proviso that it be attempted only when the weather is settled fine, with warm nights, and when plenty of honey is coming in.

Bee-keepers living in the higher altitudes with great range of temperature, must follow this plan with caution. Having caught the first swarm, place it near the old stand and shade, now remove the old hive two or three feet on one side, turning the entrance in an opposite direction to that which it previously occupied. If facing N.E. turn it to S.W. Now place another hive on the old stand, filling up the body with frames having starters only. Cover the frames with queen excluder zinc, place super above and adjust roof. Next prepare the inclined board and cloth as used for swarming, and run the swarm in at the entrance. Queen excluder may be fixed over the entrance for a day or two. If possible, the super should contain a few built-out combs. The parent hive will require further attention. For the next few days it must be turned each day a little more towards the former direction, so that by the seventh day the direction will again be N.E. On the eighth day this hive should be removed to another part of the apiary. By this means all the outside workers will return to the former stand, leaving the parent stock now so depleted in numbers that in most cases they will destroy all queen cells after the first queen makes her exit, giving no further trouble to the bee-owner.

Instead of removing the old hive to another part of the apiary, after the young queen has mated and commenced to lay, the old queen in adjoining hive may be destroyed and the two united. We thus have swarming without increase.

CHAPTER XVIII.

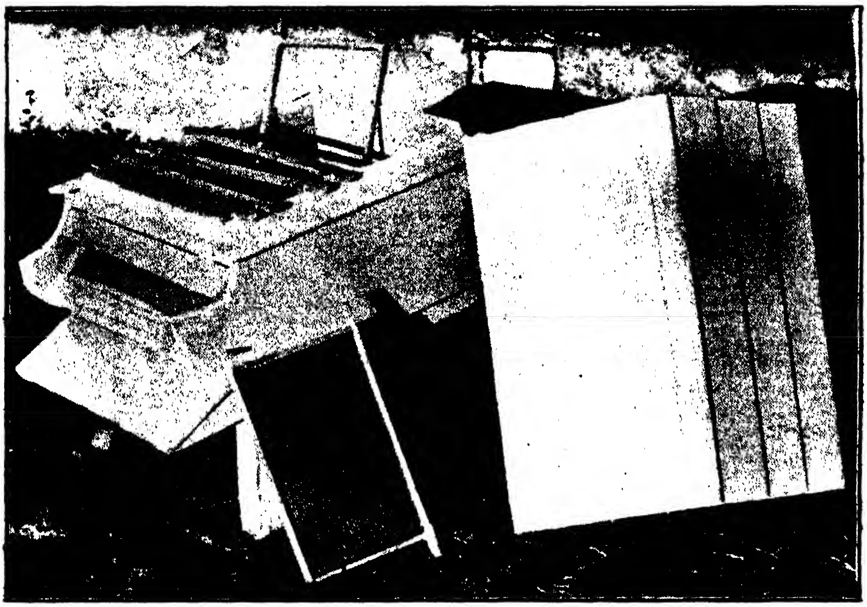
Prevention of Swarming.

How can I keep my bees from swarming? This is a very frequent question put to the expert by those who have a few hives and do not wish to increase the number. It is also a moot point with those owning larger apiaries. Many inventions have been introduced and numerous theories propounded with the object of preventing swarming entirely. As it is so utterly opposed to Nature it is not surprising that the best attempts and

appliances occasionally disappoint, and so far no satisfactory solution has been discovered.

Some races of bees are much less given to swarming than others, and this feature can be noticed amongst individual colonies of the same race. It is thought by some that, by careful selection of queens, a strain of bees will eventually be produced that can truthfully be termed non-swarmers. Very little progress has, however, been made during the last twenty years, and we have our doubts as to its ultimate success. In any case it must take many years to so completely change the nature of *Apis mellifica*, that the desire to swarm shall have been eradicated.

Swarming is largely due to the prolificness of the queen, which is a quality not to be despised. The hybrid character of the South African bee is of some assistance in measures taken for minimising swarming, where it must be left for the present, relying more upon the adoption of suitable hives and appliances as aids in this direction.



Double Walled Bar Frame Hive, showing empty body box and frames.

Many so-called non-swarming systems have been put forward from time to time, but as far as our trials of them and our own experiments go, we cannot recommend any method as absolutely certain. The advice embraced in the following lines which has frequently been given by the writer in earlier writings and lectures, still holds good, and if carefully adhered to as precautionary measures, will do much to prevent swarming or reduce it to a minimum. Swarming is generally the outcome of overcrowding, and want of space for the queen's special work. It is, therefore, very important that additional room be given in advance of the colonies' requirements. Do not wait until the colony swarms and then think about it. Do not stint ventilation below frames. Use double-walled hives, which allow of better protection from the sun, and more satisfactory ventilation. Avoid retaining old queens. Keep some foundation or empty combs going in the brood nest for the queen's use, it being our experience that the tendency to swarm is aggravated by the want of

space for rearing brood. It would extend this part of the subject too far if we were to look into all the various methods advocated, several of which could not be conveniently adopted in South Africa. But making deductions from what has come under our notice and as the result of our own experiments, the following plan may be taken as applicable to South African bee-culture. The main idea is to keep a fairly spacious compartment under the brood nest, where the bees may find scope for their natural inclination to extend their combs downward. It also affords space for their surplus energy without feeling cramped. In conformity with this idea we provide a shallow box of frames containing starters only, which is placed immediately under the brood nest. In the case of long hives having frames running parallel with the entrance, three or four frames fitted with starters are placed in front of the brood nest and next to the entrance. This is really Simmin's old plan, and gives a measure of success. It is a *sine quâ non* of this method that the supers remain undisturbed above the brood frames ,while the frames with starters are in use. Should any of the latter have combs built in them they must be at once removed and replaced by further starters.

While speaking of placing starters under the brood nest, we give the following extract of a letter received a few weeks ago from a bee-keeper in the country. We make no comment beyond saying we hope this is not a very common experience, and that such experts (?) are not numerous. The writer says:—

"I had advice from a Cape Town expert to produce combs for *extracting* (italics are ours) by putting the super under brood nest with two-inch starters. Well, I have had about three pounds of foundation cleared right off these frames and taken above, and only in one instance a start made at comb-building. I also tried full sheets below, but it was no good; all taken above and used to make brace combs and close openings in queen excluder."

Should a swarm issue in spite of all precautions, and there is no wish to increase the stock, it may be returned as follows: After securing swarm and shading as before directed, open the parent hive and cut out all queen cells whether sealed or in course of construction. Remove a few of the central combs containing hatching brood principally, which generally abounds at this time; these combs can be given to weaker colonies or nucleus hives. In place of the combs removed substitute frames of foundation, or starters, next the entrance. Assuming that supers were removed previous to this operation, they may now be replaced, and the swarm returned, as explained in a former chapter.

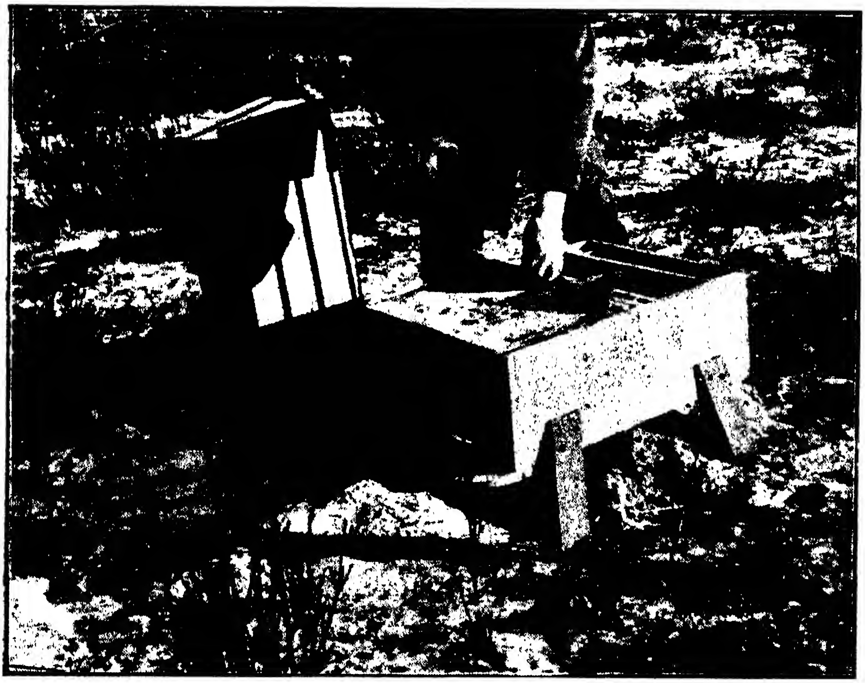
Removing the queen at the opening of the season, or disqueening, as it is called, with the removal of queen cells later will certainly prevent swarming for a time, but we find the spirit and enthusiasm of a colony suffers very considerably under such circumstances; therefore do not recommend it. If the old queen of a hive is removed early in the season before preparations for swarming are commenced, and a young one of current year given, there will be good prospects of going through the season without this hive swarming.

Swarm Catchers and Self Hivers.—Of recent years some amount of attention has been devoted to swarm catchers and self hivers, some of which are very ingeneously constructed. The use of these appliances is to prevent swarms absconding, and to avoid the trouble entailed in capturing swarms and hiving. They are certainly a convenience when bees swarm in the absence of the apiarist. The idea is simply this. When the great rush takes place at swarming time, the bees are diverted from the entrance through a perforated box fixed to the hive, which allows for the

egress of the workers, but the queen, in attempting a passage, finds herself drawn into a part of the box from which she cannot escape, or return to the hive except with great difficulty.

The swarm, on finding the queen is not accompanying them, return to the swarm catcher, and clustering with the queen on some empty combs or foundation provided for the purpose, remain there, until removed by the apiarist.

Of course swarm catchers are useless except in the case of first swarms. Young queens going off with subsequent swarms being unfertilized, readily pass through the excluder zinc with the workers, the drones only being retained in the swarm catcher.



Subduing Bees. Using Smoker.

CHAPTER XIX.

Aptificial Swarming or Dividing.

Natural conditions in this country being favourable to the multiplication of bees, swarms issue at very uncertain times, which is very often a source of great trouble, and keeps the bee-man in a state of perpetual anxiety, and even then, notwithstanding the usual precautions and patient attention, the swarm frequently makes its exit unobserved, and becomes lost to the owner. At other times the bees hang clustered outside the hive for days and weeks together, the bee-keeper being kept on tip-toe of expectation. Loitering about in this demoralising way, they are the prey

of many enemies, not forgetting the insectivorous birds who take full advantage of the occasion. To obviate this condition of things, artificial swarming comes to the aid of the modern bee-keeper. We do not advocate artificial methods as being in any way superior to natural swarming, but it is often desirable and frequently a great convenience, especially if increase of stock is required with little trouble in obtaining it.

In making artificial swarms, the following conditions must be strictly adhered to, or failure will result.

The day chosen for the operation must be fine and the bees flying freely. The hive to be swarmed should contain ten to twelve of the standard frames recommended, or eight to ten of the American pattern, all crowded with bees. There must be drones flying in the apiary unless a fertile queen is to be introduced from nucleus. If honey is not coming in, the swarms must be fed until natural supplies are forthcoming.

To Make Two Colonies from One.—This is an old but simple method for the novice. Having prepared a hive for the reception of swarm, the frames being fitted either with empty combs, foundation, or starters, remove the stock, which we will call A for simplicity, some few yards from its present position, placing the new hive where it stood, which we will call B. Now remove from A a frame or two of brood with adhering bees and the queen, placing them in the centre of B. The bees returning from the *veld* will enter this new hive now containing the queen and form the swarm. The bees remaining in A will raise queen cells over eggs or young larvae. In twelve days all but one of these cells should be cut away.

If a laying queen is available she may be introduced on the second day after making the swarm, or a sealed queen cell may be given.

This, of course, prevents loss of time and the excitement usually resulting on the removal of the old queen, which with South African bees is particularly noticeable. If B is to be run for comb honey the supers may at once be placed in position, and frames with starters only put in the body of hive. A few additional frames of bees can be shaken from the old hive A. By this means we obtain about the same result as that given by the "brushed-swarm" plan advocated in the United States of America with much less trouble.

To Make Three Colonies from Two.—In this operation one stock provides the bees and another the combs and brood.

Having selected a suitable day when plenty of bees are abroad, remove from a strong stock four or five frames of brood, shake off the bees and place the combs in a fresh hive with the addition of two or three extra frames.

Next remove another strong stock to a new position, placing the new hive on the old stand. The returning bees will enter the latter, provide for the brood, and finding no queen present, proceed to raise one or more as previously described. A fertile queen may be given or a ripe queen cell as mentioned in the last example; this will effect a saving of time, and the work of the hive will go on unimpaired.

Forming One Colony from an Indefinite Number.—Having obtained about half a dozen frames of brood from different hives *without bees*—one frame must contain eggs or young larvae—place these in an empty hive, adding two extra frames of comb or foundation.

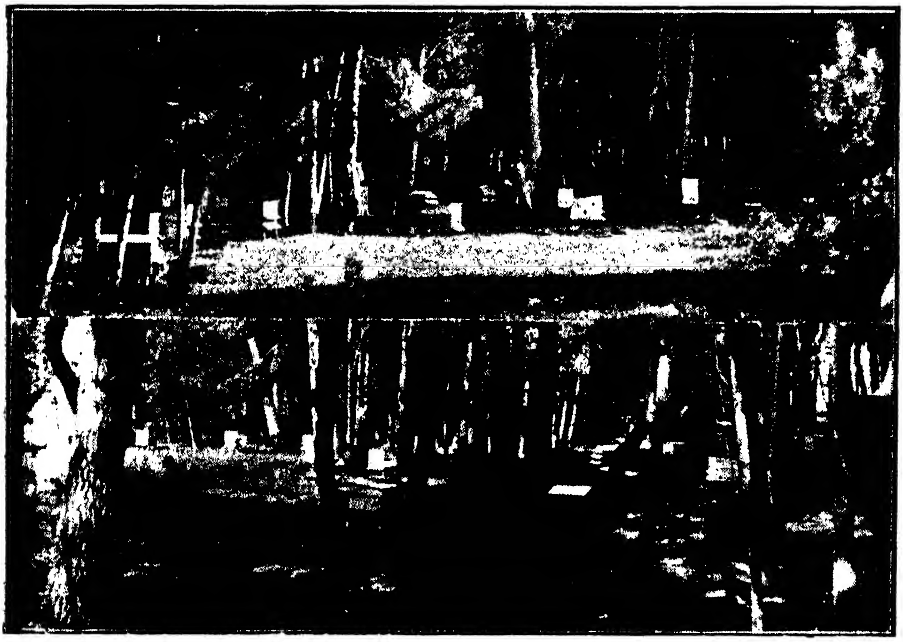
Next remove a strong stock to a new stand, placing the new hive in its stead. The returning bees will proceed as in the last example and raise a queen unless one is introduced.

CHAPTER XX.

Nucleus Swarming.

This is probably the most satisfactory and up-to-date method when working for moderate increase. We shall give one or two examples.

On a warm day when bees are flying freely, remove one of the nucleus hives (presently to be described) and place it near the hive it is proposed to deal with. The nucleus hive will contain a laying queen. Next open the old hive and take out a few frames of brood and bees, selecting frames with as much sealed brood as possible, and also some honey.



Views in early out apiary, established by the author, Cape Colony. Too much shade in the winter.

It will be understood in this and all similar examples that when speaking of sealed brood it refers to *worker brood*: drone brood is not taken into consideration during these manipulations. In all cases the details must be carefully observed.

Having previously caged the young queen on a frame in the nucleus hive, place the frames thus first removed alongside; a few other frames may have the adhering bees shaken off into the nucleus, only care must be exercised that the old queen is not carried over during the process. Next fill up the old hive and nucleus with frames of foundation and return the latter to its own stand. Many of the bees will return to the old stock next day, but sufficient will remain, which, with those rapidly maturing, will carry forward the work of the hive.

This method can generally be practised without caging the young queen, but it will be more certain if the queen is confined for about 36 hours.

The objection to the above plan in the hands of the beginner is the very great danger of passing the old queen over to the nucleus hive.

If the operation is successfully carried out the old stock will have no inclination to swarm, and the work of the hive will proceed with little interruption. The new colony may be supplied occasionally with frames of hatching brood from other colonies, if it can be spared, and having a young and vigorous queen at the head of affairs, they will make rapid progress.

The following method is perhaps simpler than the last for the inexperienced, and will give equally good results:—

Again selecting a fine day, about noon, when many bees are on the wing, bring up the nucleus hive near to the one it is proposed to operate with. After caging the young queen, take from the old hive two frames of brood, in this case some being unsealed, and place in the nucleus hive. Next remove the old stock to the stand previously occupied by the nucleus, placing the nucleus hive in its place; filling up the body with combs or foundation. The returning bees will now enter the nucleus, while those that were absent when the nucleus was removed will enter the old hive on their return. Both hives must be watched for a time, and, if necessary, strengthened with hatching brood during the building up process. The queen should be released after 36 hours' confinement. If bad weather intervene feeding must not be neglected.

CHAPTER XXI.

Uniting Two Colonies, or Bees of different Hives.

The attempt of a bee to enter a hive not its own (except under special circumstances, to be explained later) generally results in its immediate ejectment. Various theories have been advanced to explain how bees communicate with each other or recognise the presence of a stranger amongst so many thousands, and much investigation has been carried out in this direction. But owing to the extreme fineness and delicateness of the various organs found in the bee, no satisfactory solution has yet been arrived at.

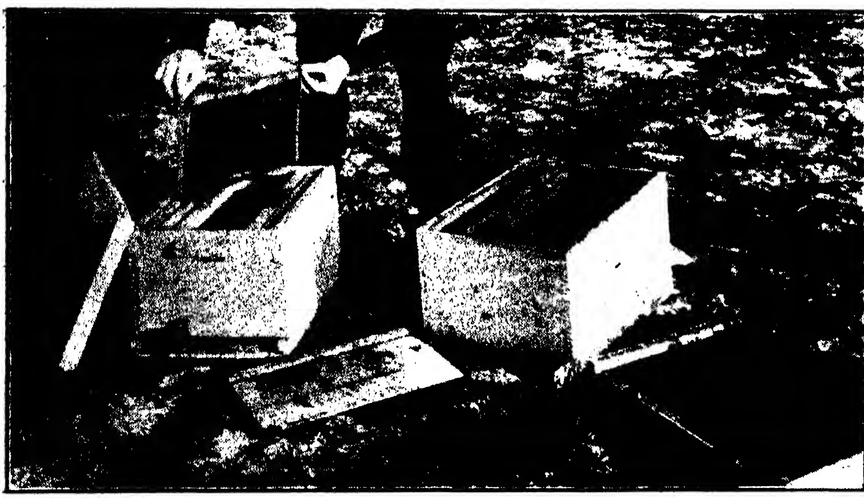
It is thought by many that the antennae plays a large part in the communication of information, which we know is carried very quickly. Other important functions are also attributed to this particular organ. It may combine with one or more of the senses known to man, others quite foreign to him, and of which he has no knowledge, and can never discover.

That bees have the sense of smell there cannot be much doubt, and working on this line it is generally accepted that the population of a hive partakes of an odour peculiar to the queen or the particular community to which they belong. The modern bee-keeper makes use of this knowledge in uniting bees of different colonies, as will be seen directly. In addition to this we can go further. Having made many experiments in this direction, I find that the actions and behaviour of a bee in entering a strange hive at once and unmistakeably betrays it. And if arriving with an empty honey sac its residence is of short duration.

In fact, if the bee-keeper will take the trouble to observe, he will notice that the sentries on duty at the hive entrance are able to discriminate the would-be intruder in some unaccountable way before it alights. And yet if a stranger should drop in by mistake with a load of nectar or pollen, free admission is usually granted, and it is allowed inside unmolested.

These observations have an important bearing on what we are now considering. The union of two or more colonies is sometimes necessary and often desirable. For instance, a hive loses its queen without any possibility of raising another, or it may be advantageous to unite two or more weak colonies; swarms issuing the same day, nucleus colonies at the end of the season, etc. Swarms should be united within twenty-four hours of swarming; it is best to shake them down together at sundown, when they generally unite peaceably. The queens will settle the question of supremacy, unless one is removed by the bee-keeper as they run into the hive. Two swarms issuing at the same time will often alight on the same spot and unite themselves without the assistance of the bee-keeper. In uniting two colonies occupying frame hives proceed as follows: Gradually bring the hives together, moving them not more than a yard or two a day, omitting those days when little outside work is done, owing to unfavourable weather.

Select the afternoon of a fine day for the final closing up. Before smoking the hives at the entrance provide about half a pint of syrup, to which has been added six drops of essence of peppermint or cloves, the



Author uniting Two Colonies in single wall hives, one being queenless and vicious.

former for preference; be sure that essence and not oil is used. Now give a good smoking at the entrance of each hive. After a short interval uncover the frames and pour a little of the scented syrup between the combs, and again use the smoker, and cover up the hives for about ten minutes. South African bees are demons to unite unless dealt with firmly. After giving them time to lick up the syrup, open out the frames of one hive, then place the frames of the other hive in between, alternating them. Should there be any difference in the queens, remove the undesirable one during the operation, otherwise a duel will decide the question for you. Keep the frames a little more than their usual distance apart for a day or two. After covering up, which must be done as expeditiously as possible, give them another smoking; repeating the dose occasionally should there be any signs of fighting. As soon as the stragglers have left the empty hive, take it some distance away.

Instead of using scented syrup, a good dusting of both colonies with flour will answer the purpose; but the syrup will be safer for the novice. If treated with flour, this should be applied through an ordinary kitchen

dredger. In uniting two colonies, one being queenless, it will be a wise precaution to cage the queen in the other hive before the final amalgamation. She can be liberated next day. Observe that the bees of both colonies get a thorough mixing. If they start fighting apply the smoker.

CHAPTER XXII.

Loss of Queen.

The loss of a queen, whether by death or other cause, is a deplorable event, and which is soon recognised as such throughout the hive. The excited condition of the bees inside and outside the hive betoken something is the matter, which will not long escape the notice of an observant bee-keeper.

Especially in the early morning and late evening, when other colonies are quiet, the bees of the queenless hive show signs of trouble. Instead of the low, steady hum of contentment heard at the other hives in the apiary, from this one comes the high-pitched, plaintive cry of despair and trouble. Hundreds of workers will be seen rushing about on the alighting board up the front and round the side of hive in a state of fearful agitation, many falling to the ground through sheer exhaustion. This confusion continues unabated inside and outside the hive for two or three days. About the third day, should the hive contain eggs and young larvae, the workers commence to raise queen cells. From this time the excitement diminishes, but although returning to work, a lack of energy is seen for several days. Should there be no eggs or young larvae in the hive, the colony must inevitably perish, unless a remedy is found by the owners, either by introducing a fertile queen or giving the colony a frame containing eggs or young larvae from which they can raise one. It is thought by some that bees from queenless hives having no young brood gain entrance to other hives occasionally, purloining eggs for raising queens. We have never been able to prove this, but certainly have had cases brought to our notice which have looked very like it.

Queenlessness may often be attributed to other causes besides the decease of queen through old age. Many young queens are lost on their wedding tour, some captured by birds, others having imperfect or injured wings, being unable to fly, are lost some little distance from the hive. Others, again, in returning attempt to enter the wrong hive, and are killed by the guards. Another frequent cause is over manipulation at the wrong season. Queens are sometimes killed or fatally injured in removing or replacing frames, especially in hives where no lateral movement is possible, to allow separating the frames before lifting out.

"Balling" of the queen will sometimes happen; opening a hive in the presence of robbers is the usual cause. From nervousness, fright, or some other unaccountable reason some of the bees close about the queen until she is covered up in the centre of a little compact ball, about the size of a small plum, often ending in her death by suffocation. On introducing strange queens they are frequently hugged in this fashion. When it is noticed that a queen is being balled ply the smoker in that direction, being careful not to place the nozzle of the smoker too close in the excitement of the moment. After separating the queen, should she be still alive, notice if there is any tendency to ball her again. If so, cage her for a day or two on a comb containing honey, and watch her reception

when liberated. If the balling is persistent and smoke does not drive them off, drop the whole ball into water, when the queen may be rescued and caged.

Should a hive become queenless at a time when there are no drones flying in the apiary or neighbourhood, and there is no nucleus hive with laying queen on hand, the colony must be united to another one. Always make an inspection of a hive about 15 days after swarming to ascertain the presence of the queen or otherwise. Should there be any doubts about it, give them a frame of eggs and young brood, and make a re-examination a day or two afterwards. If it is found that queen cells have been started

Double walled hive. Outer case and roof removed, showing box of shallow frames and rack of sections.

on this comb they can be destroyed and a laying queen introduced; failing this, they may be allowed to continue the queen cells. The presence of a laying worker must be thought of, and if any indications are seen steps must be taken to stop her futile work. When hives are left queenless for any length of time and fertile workers firmly establish themselves, it is often difficult to get bees to accept a strange queen or take any interest in raising one from young brood or eggs supplied to them. Should this be found the case, cut the matter short by uniting them to another colony having a prolific queen. In the course of a week or two this stock can again be divided if required and a fertilised queen given to one portion.

(To be continued).

THE AGRICULTURAL SOILS OF CAPE COLONY.

INVESTIGATION AND ANALYSES.

By C. F. Juritz, M.A., D.Sc., F.I.C.

(Continued from Page 187.)

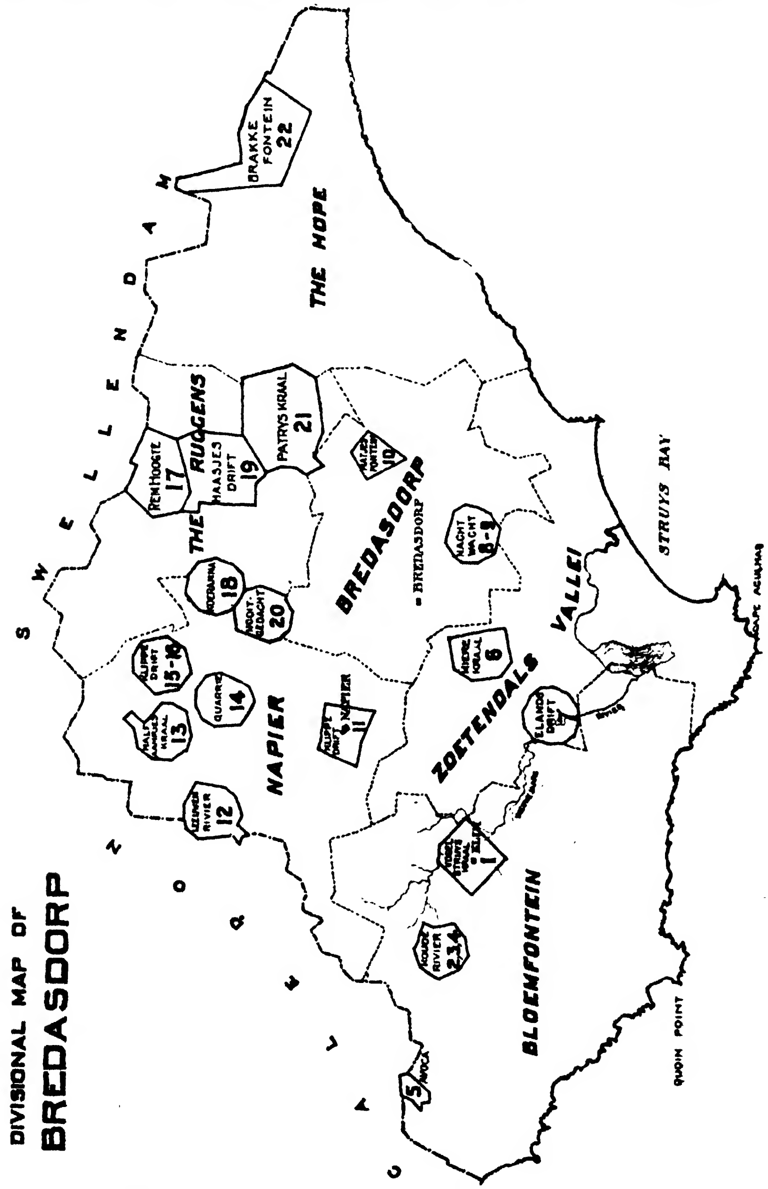
Bredasdorp.

(Officially collected.)

No.	Field Cornetcy.	Farm or Place.	Collector.
1.	Bloemfontein.	Vogelstruis Kraal.	J. Muller.
2.	"	Koude Rivier.	"
3.	"	"	"
4.	"	"	"
5.	"	Avoca	"
6.	Zoetendals vallei.	Miere Kraal.	"
7.	"	Eland's Drift.	"
8.	Bredasdorp.	Nachtwacht.	"
9.	"	"	"
10.	"	Matjesfontein.	"
11.	Napier.	Klippe Drift.	"
12.	"	Leeuwen Rivier.	"
13.	"	Halfaampjes Kraal.	"
14.	"	Quarrie.	"
15.	"	Klippe Drift.	"
16.	"	"	"
17.	The Ruggens.	Rem Hoogte.	"
18.	"	Koeranna.	"
19.	"	Haasjes Drift.	"
20.	"	Nooitgedacht.	"
21.	"	Patrys Kraal.	"

The soils of the Bredasdorp Division are for the most part of two broad classes; the larger portion of the Division is covered by the Ruggens or shaly soils of the Bokkeveld geological series, while to the south lie the soils of the Downs. In the adjoining Division of Swellendam a third belt—the sandstone soils, already noticeable in the Caledon Division on the journey eastwards from Cape Town—again begin to acquire prominence, and further east, in the Riversdale Division, these three parallel belts, running east and west, are distinctly recognisable.

Sample No. 1, a stiff white clay, was taken from the slope of the hill east of the village of Elim. About six miles W.N.W. of that village, Nos. 2, 3 and 4 were collected on the farm Koude Rivier: they represent respectively a sandy clay, a sandy loam, and an alluvial sandy humus soil, and were taken from lands S.W., south, and east of the homestead. Al-



though the subjacent rocks are those of the Malmesbury series, these four soils had evidently been largely influenced by the Table Mountain sandstone and quartzites from the ranges about Elim. Basic slag had, to some extent, been used on this farm. Proceeding some nine miles to the west of Koude Rivier, a sandy soil, No. 5, was taken from a small granite outcrop on the farm Avoca, which is the chief tobacco growing farm in this

district: here the surrounding hills are composed mainly of Table Mountain sandstone. On the farm Miere Kraal, about 13 miles east of Elim, a loose sandy clay, No. 6, was collected. A chain of recent limestone hills crosses the south-eastern part of this farm. Eland's Drift, a fairly large grain farm, was next visited: it is situated on the right bank of the Nieuwjaars River, about 6½ miles S.W. of Miere Kraal. On this farm, No. 7, a stiff red clay soil, was taken.

From Nachtwacht, the farm of Mr. D. Albertyn, about 5½ miles south-east of the village of Bredasdorp, No. 8, a sandy loam, and No. 9, a loose clay soil, were taken from lands situated respectively south-east and south of the homestead. Mr. Albertyn considers that in the dry season the former soil is the better of the two. Between this farm and the village, the compacted limestone which, intermingled with blown sea-sand, forms about six hundred square miles of coast belt, appears on the surface. No. 10, a loose gravelly clay, was taken from the farm Matjesfontein, situated on the boundary of the Ruggens and the Downs, about 8½ miles E.N.E. of Bredasdorp.

Sample No. 11, a loose clay soil, was taken from lands about half a mile north-east of the village of Napier. Proceeding thence to the farm Leeuwen Rivier, another loose clay soil, No. 12, was obtained from lands on a hill N.N.E. of the homestead. This, and all the remaining samples of the series, were taken from the Bokkeveld area, and are consequently types of Ruggens soils. The next sample, No. 13, from the farm Halfaampjes Kraal, 6½ miles north-east of Leeuwen Rivier, was a gravelly clay. On a portion of this farm the earth of the soil is very considerably interspersed with large fragments of clay slate. This is also the case at Quarrie, where a loose clay, No. 14, was taken from lands lying north-east of the dwelling-house. From Klippe Drift, about four miles N.N.E. of Quarrie, two samples of soil were collected: No. 15 represents a loose, gravelly clay from elevated lands, and No. 16 a soil of more Karroo type, from low lands devoid of fragments of clay slate such as those noticed at Halfaampjes Kraal and Quarrie. Gravelly deposits, of the nature of that just alluded to, are frequently met with scattered about the high lands in this and the adjoining divisions, for example, at Zwartklip, in the Swellendam Division, to which reference will be made later. Regarding the two soils last referred to, Mr. Wessels, one of the occupants of the farm, was of opinion that during wet seasons No. 16 proved the better.

At Rem Hoogte, just about eleven miles east of Klippe Drift, No. 17, a loose clay soil, was obtained: another such soil, No. 18, was collected 6½ miles south-west of this, on the farm Koeranna, while at Haasjesdrift, seven miles east of the last, No. 19, a loose gravelly clay soil, was taken. The next farm visited was Nooitgedacht, or Zout Rivier, about four miles S.S.W. of Koeranna, where No. 20, a light loose clay, was collected. No. 21, a loose red clay, was taken from the farm Patrys Kraal, about four miles south of Haasjesdrift.

On account of long continued drought the crop returns of the three consecutive years preceding this visit to the division had been very scanty; some farms, in the neighbourhood of those mentioned, had, in fact, been totally deserted owing to scarcity of water.

(Privately collected.)

No.	Field Cornetcy.	Farm or Place.	Collector.
22.	The Hope.	**Brakkefontein.**	**C. Marais.**

On the farm Brakkefontein samples of surface soil were collected from five different spots, at the foot of the Potteberg Range, and just below the Potteberg Trigonometrical station. The five lots of soil were

thoroughly mixed and an average sample was then taken for analysis. This surface soil is rather loose and sandy, and, as may be expected under the dominating influence of the sandstone range, proves to be poor in plant food. About five feet below the surface there is a deposit of water-worn pebbles mixed with yellowish clay, from twelve to eighteen inches thick, overlying a very dark loamy water-bearing stratum from five to ten feet in thickness. Under that lies another layer of very fine yellowish clay. Lucerne and vegetables of all kinds, especially root crops, have been found to flourish luxuriantly on this soil.

The analyses of all the foregoing soils of this Division are given below: —

(Method II.)

	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through 3 mm. sieve.		
No.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	0·67	3·27	·0099	·15	·11	·063	·0092
2.	1·80	8·08	·045	·16	·26	·045	·016
3.	0·74	3·45	·012	·13	·12	·036	·0082
4.	0·71	4·06	·0092	·12	·14	·016	·022
5.	0·38	2·36	·015	·17	·32	·071	·013
6.	0·95	5·14	·014	·15	·28	·13	·026
7.	1·18	3·58	·0085	·15	·11	·10	·013
8.	0·54	2·83	·011	·15	·25	·076	·028
9.	1·10	5·65	·018	·16	·40	·12	·015
10	0·92	5·30	·011	·16	·31	·23	·0038
11.	1·25	7·95	·0096	·18	·20	·062	·011
12.	1·63	9·65	·019	·18	·15	·18	·026
13.	1·39	6·94	·011	·15	·18	·19	·032
14.	1·27	7·01	·029	·17	·16	·11	·026
15.	0·95	5·86	·021	·16	·37	·13	·028
16.	0·91	4·23	·028	·17	·094	·089	·019
17.	1·32	6·91	·017	·15	·15	·19	·038
18.	1·43	7·19	·043	·077	·15	·15	·030
19.	1·65	6·34	·0071	·15	·16	·12	·024
20.	0·71	3·96	·0064	·19	·094	·15	·022
21.	1·02	2·89	·017	·16	·20	·098	·010

(Method I.)

	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
22.	90·6	1·75	5·35	·022	·147	·064	·017	·045

Nearly all these soils contain satisfactory quantities of Nitrogen, but they are almost uniformly lacking in phosphoric oxide. Those of the Bloemfontein Field-cornetcy are badly supplied with potash, but the rest of the Division is apparently better off in this respect. Most of the soils contain a fair amount of lime, although less than those of Robertson and Swellendam.

(Officially collected.)

No.	Field Cornetcy.	Farm or Place.	Collector.
1.	'Nhlambe.	'Nhlambe.	St. C. O. Sinclair.
2.	"	"	"
3.	Butterworth.	Butterworth.	"
4.	"	"	"
5.	"	"	"
6.	"	"	"
7.	"	"	"

Samples 1 and 2 of this Division were collected on the farm 'Nhlambe, the former Residency, now the property of Mr. Burgersheim. They were taken from lands lying along the Gcua River, and may be considered to represent the soil derived from the sandstones of the Kentani beds belonging to the Karroo system, which lie S.S.E. of Butterworth. Fruit trees thrive here, and oats also do well. No. 3, a black soil, was collected about six miles from Butterworth, in the same direction as the previous samples. It represents a doleritic soil, but, contrary to what has been found elsewhere, the chemical analysis (*vide* table below) shows it to be an all-round poor soil, as far as mineral plant food goes. No. 4 is a sample of black soil overlying sandstone, collected at a point about two miles E.S.E. of Butterworth village. No. 5 was taken from a spot two miles N.N.W. of Butterworth, and is typical of the soil found on the hillocks—studded with doleritic boulders—which are common in this part. The subsoil is a red, somewhat coarse, gravel, which rises to within eighteen inches of the surface. Samples 6 and 7 represent the Government plantation at Butterworth village. The former, a black, micaceous, somewhat clayey soil, typifies the surface soil to a depth of about nine inches. No. 7 represents the second nine inches of the soil. These soils appear to be the result of the decomposition of the micaceous sandstone and black shales that constitute a portion of the sedimentary rocks to which name of Idutywa beds has been assigned by the Geological Commission. On the plantation represented by the last named soils grains of all sorts thrive well; so also do wattles, blackwoods, and sneezewoods, and varieties of cypress. Pines, on the other hand, do not seem to thrive.

The following table shows the results of the chemical analyses:—

(Method I.)

	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	94·5	3·89	6·61	·0071	·175	·202	·029	·026
2.	97·0	3·24	6·89	·0340	·189	·094	·071	·023
3.	94·4	2·82	5·91	·0283	·168	·080	·023	·015
4.	87·1	3·77	8·67	·0233	·203	·146	·130	·033
5.	96·4	4·77	10·04	·0290	·217	·106	·085	·052
6.	94·4	2·60	6·31	·0276	·189	·096	·134	·036
7.	94·6	1·74	3·69	·0248	·056	·066	·205	·033

All these soils exhibit a deficiency of phosphoric oxide, nor can they be said to be well supplied with lime and potash; indeed, the former plant food constituent is lacking in many of them. On the other hand, most of the samples show a fair proportion of nitrogen.

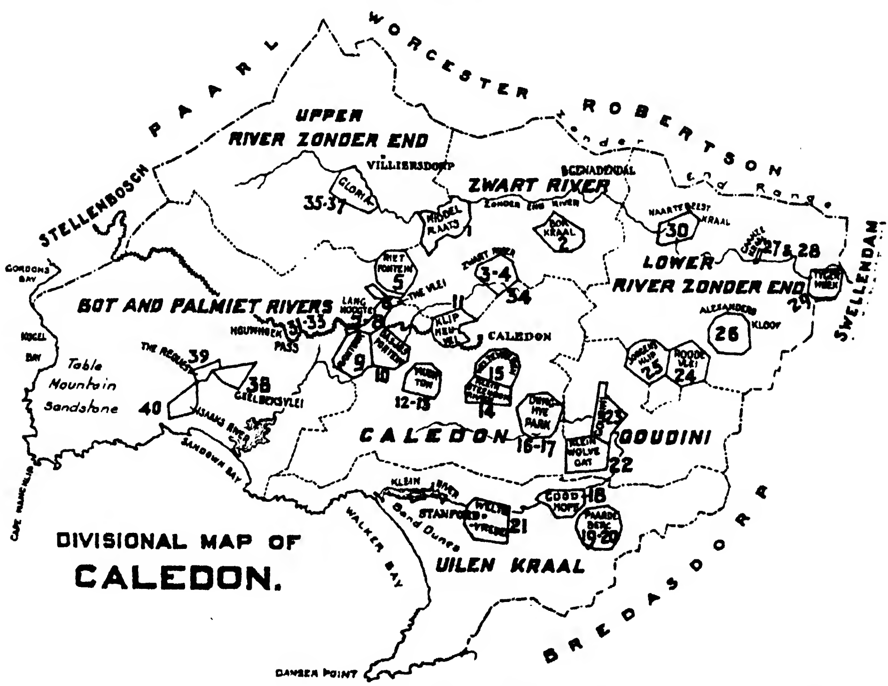
CALEDON.

(Officially collected.)

No.	Field Cornetcy.	Farm or Place.	Collector.
1.	Upper River Zonder End.	Middelplaats.	J. Muller.
2.	Zwart River.	Bok Kraal.	,,
3.	,,	Zwart River.	,,
4.	,,	,,	,,
5.	Bot and Palmiet Rivers.	Rietfontein.	,,
6.	,,	The Vlei.	,,
7.	,,	Langhoogte.	,,
8.	,,	,,	,,
9.	,,	Avontuur.	,,
10.	,,	Dasjesfontein.	,,
11.	Caledon.	Klipheuvel.	,,
12.	,,	Muurton.	,,
13.	,,	,,	,,
14.	,,	Klein Steenboks River.	,,
15.	,,	Weltevreden.	,,
16.	,,	Dunghye Park.	,,
17.	,,	,,	,,
18.	Uilen Kraal.	Good Hope.	,,
19.	,,	Paarde Berg.	,,
20.	,,	,,	,,
21.	,,	Weltevreden.	,,
22.	Goudini.	Klein Wolvegat.	,,
23	,,	Goudini.	,,
24.	Lower River Zonder End.	Roode Vlei.	,,
25.	,,	Jongens Klip.	,,
26.	,,	Alexanders Kloof.	,,
27.	,,	Ganze Kraal.	,,
28.	,,	,,	,,
29.	,,	Tygerhoek.	,,
30.	,,	The Oaks.	,,

The collection of soil samples in this Division commenced with a visit to the farm Klipheuvel, 2¾ miles W.N.W. of the village of Caledon; here sample No. 11, a sandy clay soil, was taken. About 6½ miles north-west of this farm, sample No. 5, a loose clay was collected on the farm Rietfontein; the soil represented by this sample had not been cultivated for ten years. Proceeding thence about three miles to the south, No. 6, a sandy clay, was taken from Mr. J. le Roux's farm The Vlei. Neighbouring farmers stated that there is a noticeable difference between the crops raised at that place, and those at Langhoogte, a farm lying nearly a mile south of The Vlei. Samples Nos. 7 and 8 were accordingly collected at Langhoogte, both of them sandy clays; No. 8, however, is more of a Karroo type, and was considered to show greater fertility than No. 7. As will be seen from the table below, the only chemical superiority that the former of these two soils shows over the latter is in respect of the phosphoric oxide contained; in the same respect it is also better than the soil taken at The Vlei.

The next place visited was the farm Avontuur, about $5\frac{1}{2}$ miles south-west of Langhoogte; and here a stiff clay, sample No. 9, was collected. Proceeding about two miles in an easterly direction along the Zwart River, another stiff clay soil, sample No. 10, was obtained on the farm Dasjesfontein—a soil that had not been cultivated during the last four years, and quite different in character from any of the former samples. It will be noticed that analysis shows it to contain a very much larger proportion of phosphoric oxide. From the farm Muurton, or Klein Zwart River, about $4\frac{1}{4}$ miles south-east of Dasjesfontein, two samples,—No. 12, a stiff clay soil, and No. 13, a loose clay from an alkaline or brack land—were taken. The soil represented by the latter of these two samples had not been cultivated for about five years; as will be observed from the analyses below, it proved to be exceedingly poor in lime. The farmers in this neighbourhood used, as a fertiliser, lime obtained from the sea-shells of the Bot River Strand, scattering it along with the wheat when sowing. They had also commenced employing artificial fertilisers in small quantity, principally Basic slag.



DIVISIONAL MAP OF CALEDON.

On the farm Klein Steenboks River, about six miles east of Muurton, a ferruginous clay soil, No. 14, was procured, and about three miles N.N.E. of this farm, No. 15, a sandy clay, was obtained on the farm Weltevreden: it had not been cultivated for the last seven years. The soil here is very shallow, extending to a depth of about six inches only, below which a layer of coarse gravel is met with. Four miles south-east of this, samples of two varieties of clay soils were taken from Dunghye Park, the farm of Messrs. De Villiers Bros., perhaps the largest and richest farm in this part of the Division. No. 16 represents a stiff clay soil adjoining the vineyard, while No. 17, a loose clay, was taken from brack land on the other side of the river. The former was considered preferable to the latter for sowing purposes during dry seasons. As only imported seed was sown, rust did not appear in the crops. At Klein Wolvegat, about

six miles south-east of Dunghye Park, No. 22, a loose clay soil, was obtained from the mountain side. Proceeding south from here along the Klein River, the farm Good Hope was touched at, and a stiff clay soil, sample No. 18, was taken from brack land. The next place visited was the farm Paardeberg, about three miles south-east of Good Hope. Here two samples were collected; No. 19, a sandy, clay soil, which had not been under cultivation for nineteen years, and which the owner of the farm considered to be very poor, and No. 20, a very stiff clay, which practical experience had proved to be very fertile. This sample represents the only stiff red clay in the vicinity. The physical and chemical differences between samples 19 and 20 are mainly these: No. 20 is finer in texture and retains moisture better; it contains more organic matter, and has fifty per cent. more nitrogen and about six times as much potash; these facts apparently more than compensate for its low proportions of lime and phosphates: it would no doubt be improved by Basic slag. No. 19, on the other hand, which is a purely sandstone derived soil, notwithstanding its possessing more lime and phosphoric oxide than No. 20, exhibits an all-round poverty, without any redeeming feature whatever; hence it does not surprise one to be told that when it is put under cultivation it fails to bring its crops to perfection, the ears of corn generally shrivelling up before attaining maturity. Sample No. 21, a sandy clay, was taken from the farm Weltevreden, about a mile north-east of the village of Stanford. Further south blown sands, similar to those which cover the Cape Flats, are met with: these sand dunes consist of finely divided particles of sea-shells and quartz sand, with occasional compacted limestones.

Eastwards from Caledon a sandy clay, No. 23, was obtained from Goudini, the farm of Mr. D. H. Kleyn, about 4½ miles north of Klein Wolvegat. As a fertiliser Mr. Kleyn was in the habit of using principally bone manure, from which he obtained very good results. This is by no means surprising, for the analysis shows the soil to be very deficient in lime, while its phosphoric oxide is not much better. Proceeding about seven miles in a north-easterly direction, the farm Roode Vlei was visited, and a stiff clay, No. 24, was sampled. On the farm Jongens Klip, 3½ miles further W.N.W., sample No. 25 was taken, representing a sandy clay, of somewhat stony character. Sample No. 26, also a sandy clay soil, was procured from the farm Alexanders Kloof, about seven miles E.N.E. of Jongens Klip, and said to be more fertile than the soil represented by the sample taken at the latter spot. From a chemical point of view, however, there is no practical difference between these two soils, nor are they very different physically. Crossing the River Zonder End, about 6½ miles N.N.E. of Alexanders Kloof, the samples numbered 27 and 28 were taken from the farm Ganze Kraal, on the northern bank of the River Zonder End, and south of the Zonder End Range. The latter of these two samples is a stiff clay, while the former is a loose alluvial clay, darker in appearance than the other, on account of the larger proportion of organic matter contained. The distance between the two points is not 160 yards, the boundary line being very distinct. Both soils are planted with vines and fruit trees, while the grain lands are all on the south side of the river. Proceeding about 5½ miles eastwards, all along the river, Tygerhoek, the farm of the Misses Vynes, was reached, and here sample No. 29 was obtained on the south side of the river; it represents a stiff clay, light yellow in appearance. The next farm to be visited was The Oaks, or Hartebeest Kraal, nearly seven miles from Ganze Kraal, higher up the river in a west-north-westerly direction. Here sample No. 30, a stiff clay, was collected.

North of Caledon the first place visited was Bok Kraal, about four miles south of Genadendal. Here sample No. 2 was collected, also a stiff clay soil. From the farm Zwart River, about 6½ miles south-west of the last one, Nos. 3 and 4 were obtained: the former, a sandy clay, rather stony, was taken from a hill slope, whereas the latter, more sandy, was collected from the low lying lands in the valley: as the table of analytical results will show, the sandier soil is in all respects the poorer of the two. The last sample collected on this tour, No. 1, was taken from the farm Middelplaats, about five miles north-west of Zwart River.

With the exception of samples 5, 10, 13, 15, and 19, none of which had been under recent cultivation, all the above represent virgin soils.

(Privately collected.)

No.	Field Cornetcy.	Farm or Place.	Collector.
31.	Bot and Palmiet Rivers.	Houw Hoek.	C. E. Pillans.
32.	,,	,,	,,
33.	,,	,,	,,
34.	Zwart River.	Zwart River..	J. W. Hartford.
35.	Upper River Zonder End.	Kale Ruggens.	C. Lange.
36.	,,	,,	,,
37.	,,	,,	,,
38.	Bot and Palmiet Rivers.	Geelbeks Vlei.	C. Lindholm.
39.	,,	The Request.	,,
40.	,,	Isaaks River.	,,

Three samples, Nos. 35, 36, and 37, were taken from a valley near the Upington Bridge, on Mr. Charles Leonard's stud farm, Kale Ruggens, now known as Gloria, which is situated about five miles south-west of Villiersdorp, on the River Zonder End. The estate is almost encircled by sandstone hills, and Mr. Lange, the manager, declares that his best efforts have followed the use of guano from the Government islands, with a top-dressing of nitrate in the case of oats, and lime and sheep manure in the case of lucerne, which, under such conditions, thrives very well indeed. The surface soil at the locality where these samples were taken is a sandy loam, with a clay subsoil; the slopes adjacent to the valley consist of the usual alluvial soil, locally known as "klippers grond."

Nos. 38, 39, and 40 were collected from farms situated on the Table Mountain sandstone, of which the Paardeberg Mountains are composed. As may be anticipated, therefore, they are, generally speaking, poor. In the case of the soil from The Request it appears likely that the sample is not sufficiently typical—in other words, that the soil it represents had undergone some artificial improvement whereby it had been rendered chemically richer than the average soil in the vicinity. Nos. 31, 32, and 33 were collected at Houw Hoek, from the orchard of the late Mr. Aspinall: the plot of land whence they were taken lies across the road from the house, on the north-west side of the main road to Caledon. Here also, the soil is, as a rule, poor, being derived largely from the sandstone of the Table Mountain series, whereof the Houw Hoek Mountains are built up.

Sample No. 34 was collected on the farm Zwart River, adjoining the farm Sergeant's River, on the Genadendal road, about ten miles from Genadendal. The soil is poor all round, like the sandy soil No. 4, officially collected on the same farm.

The analyses of the foregoing forty soils are tabulated below:—

(Method II.)

No.	Percentage of Soil sifted through 1 mm Sieve.				Percentage of Soil sifted through 3 mm. Sieve.		
	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	·73	2·67	·55	·084	·27	·13	·033
2.	1·06	3·85	·0061	·13	·034	·076	·038
3.	1·24	6·69	·0086	·15	·034	·13	·059
4.	·51	2·15	·093	·091	·018	·043	·038
5.	1·60	6·57	·0038	·17	·093	·050	·058
6.	1·44	6·33	·0040	·15	·028	·056	·036
7.	2·04	11·71	·0038	·25	·083	·073	·032
8.	1·42	6·60	·0056	·15	·030	·038	·058
9.	1·48	7·57	·017	·15	·026	·098	·049
10.	1·27	6·43	·0034	·13	·098	·060	·12
11.	2·05	8·30	·0031	·19	·080	·078	·077
12.	·87	4·36	·0042	·11	·039	·036	·056
13.	1·37	5·25	·018	·10	·018	·055	·038
14.	1·27	4·94	·0042	·15	·15	·076	·056
15.	1·56	6·14	·0050	·15	·024	·073	·056
16.	1·49	5·81	·0021	·14	·038	·048	·072
17.	1·67	7·42	·0055	·20	·045	·087	·059
18.	1·28	5·21	·0070	·15	·040	·044	·051
19.	·88	3·37	·0049	·091	·054	·041	·046
20.	1·57	5·21	·0055	·13	·029	·24	·032
21.	·84	3·22	·0027	·11	·038	·024	·056
22.	1·38	6·57	·0097	·17	·025	·045	·036
23.	1·58	7·88	·0058	·20	·016	·072	·036
24.	1·93	7·98	·0034	·17	·058	·068	·13
25.	1·93	7·04	·0064	·18	·032	·071	·051
26.	1·87	7·19	·0034	·20	·045	·078	·061
27.	2·10	8·20	·014	·22	·058	·049	·061
28.	1·37	4·39	·0049	·098	·030	·061	·041
29.	·95	4·60	·0042	·13	·026	·042	·038
30.	1·19	6·04	·0037	·16	·041	·045	·056
31.	5·22	11·45	·005	—	·45	·066	·022
32.	1·25	2·46	·066	—	·021	·033	·067
33.	·89	3·64	·022	—	·022	·012	·014
34.	—	—	—	—	·091	·036	·013

(Method I.)

No.	Per cent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
35.	73·5	·47	1·77	·010	·101	·010	·017	·037
36.	64·3	·86	2·92	·008	·087	·006	·008	·028
37.	52·5	·34	1·26	·008	·080	·008	·008	·015
38.*	81·6	·58	3·36	·0099	·098	·044	·014	·0089
39.	—	·81	—	·009	·15	·18	·24	·06
40.	—	1·01	—	·007	·16	·014	·09	·05

* For mechanical analysis of No. 38, see under "Physical composition of soils," Part VII.

No. 1 of the foregoing soils is undoubtedly brack or alkaline, and it is significant that the alternative name of the farm Middelplaats, whence it was taken, is Brakfontein: the high proportion of chlorine in this sample will be noticed.

It is not at all surprising to find how poor in all inorganic plant food the primary sandstone soils of this Division prove to be. In the tables of analytical results illustration hereof is afforded by the soils from Dasjesfontein (No. 10), Klipheuvel (No .11), Dunghye Park (No. 16), Paardeberg (Nos. 19 and 20), and Klein Wolvegat (No. 22).

It will be seen that very many of the soils of this part of the Colony are distinctly deficient in lime: the area in which they lie is almost entirely hemmed in by sandstone. Further east, in the Bredasdorp Division, and in the western portion of the Division of Swellendam the influence of the sandstone ceases, and accordingly the soils in those parts contain more lime.

Cape.

(Officially collected.)

No.	Field Cornetcy.	Farm or Place.	Collector.
1.	Diep River.	Tokai.	J. G. Rose.
2.	,,	,,	,,
3.	,,	,,	,,
4.	,,	,,	,,
5.	,,	,,	,,
6.	Cape Town.	Parliament House grounds.	A. Simons.
7.	Tygerberg and Kuils River	Bloemhof.	J. Muller.
8.	,,	,,	,,
9.	,,	,,	,,
10.	,,	,,	,,
11.	,,	Maastricht.	C. F. Juritz.
12.	,,	,,	,,
13.	,,	,,	F. Blersch.
14.	,,	,,	,,
15.	,,	Eversdal.	C. F. Juritz.
16.	,,	,,	,,
17.	Durban.	Meerendal.	F. Blersch.
18.	,,	Johannesfontein.	,,
19.	,,	Diemersdal.	,,
20.	,,	,,	C. F. Juritz.
21.	,,	,,	,,
22.	,,	Phesante Kraal.	,,
23.	,,	,,	,,
24.	,,	,,	,,
25.	Palen and Rietvlei.	Vissers Hok.	,,
26.	,,	Government land north of Vissers Hok.	,,
27.	Koeberg No. 1.	Vrymansfontein.	,,
28.	,,	,,	,,
29.	,,	Rondeboschjesberg.	,,
30.	,,	Ongegund.	,,
31.	,,	Altona.	,,
32.	,,	Adderley.	,,

No.	Field Cornetcy.	Farm or Place.	Collector.
33.	Koeberg No. 1.	Hooge Kraal.	J. G. Rose.
34.	,,	,,	,,
35.	Koeberg No. 2.	Klein Olifants Kop.	C. F. Juritz.
36.	,,	Kalkfontein.	,,
37.	,,	Uitkyk.	,,
38.	,,	,,	,,
39.	,,	,,	,,
40.	,,	Dassen Vallei.	,,
41.	,,	Klein Dassen Berg.	J. C. Watermeyer.
42.	Blaauwberg.	Lange Rug.	,,

The first five samples were collected at the Tokai Convict Station: No. 1 was a very poor sandy soil from the vicinity of the camp which had been used for interning prisoners of war; it had just produced an oat crop, and a similar crop was grown some five years previously, a small quantity of guano having been applied for each crop. No. 2 represents a dark soil which it was intended to use as a vineyard, and had been cultivated for the last twelve or fifteen years with garden crops. Farmyard manure and guano had been applied at various times, and basic slag three years before the collection of the sample: the old estate vineyard used to be located here. The third sample was a moist black vlei ground, virgin soil, but interspersed with palmiet roots. The next was a brown soil from the rifle range garden cultivated for five years, and manured with farmyard manure and guano. The last of these five samples represents a brown soil from the neighbourhood of the Porter Reformatory; it had also been under cultivation, but no details regarding the manures employed could be obtained. The last two samples proved exceedingly poor in their reserve of plant food.

Within the Municipality of Cape Town, No. 6 affords an idea of a cultivated and frequently manured garden soil: the sample analysed represents the average of the soil within the grounds of the Parliament Houses. Samples were taken from different points in the grounds and well mixed together, and an average sample was then subjected to chemical analysis.

Four samples of soil from the Hon. R. P. Botha's farm Bloemhof, or The Hope, were analysed. No. 7 was a yellowish sandy vineyard soil, taken from north-east of the homestead; it had not been manured during recent years, and was found in practice to be very poor. No. 8 was taken from another part of the vineyard, north of the homestead; it was more clayey than the foregoing, but mixed with coarse gravel: it is found to be more productive than No. 7. No. 9 represents a poor and very sandy soil; the sample was taken from the vineyard north-west of the house. No. 10 was a very stiff clay, also from the vineyard west of the house, and proved to be fairly good in practice. In the collection of these four samples the soil for six inches nearest the surface was discarded, and the next twelve inches collected for examination. A glance at the analytical tables will show that the first three of these soils exhibit an all-round lack of plant food, but that No. 10 is distinctly better than those in both lime and potash: it may therefore be said that to this extent chemical analysis here again confirms practical experience.

Samples 11, 12, 13 and 14 were taken from the farm Maastricht, lying S.S.W. of the village of Durbanville. Rust had worked great havoc amongst the crops for three consecutive years, but the season previous to the collection of the samples had witnessed a remarkable immunity from attack. Samples 11 and 12 were virgin soils, taken at a distance of about 3½ miles from Durbanville. Nos. 13 and 14 were taken from cultivated areas which had been infested with *Erysiphe graminis* in the wheat crops;

these two samples were collected some time subsequent to Nos. 11 and 12, and the disease was then in full swing. The next farm visited was Diemersdal, and here too samples were taken on two different occasions. Here also a visitation of rust, similar to that experienced at Maastricht, had taken place: two years before the farm was first visited for the collection of soils the entire crop had been destroyed, but during the succeeding season the crop had not been affected at all. Nos. 20 and 21 were virgin soils taken at a mean distance of about 2¼ miles north of Durbanville. No. 19 was taken on a later occasion, and under similar conditions to Nos. 13 and 14. Nos. 17 and 18 were also collected from lands where the grain had been badly affected at the time with the above-mentioned parasitic disease. At Vrymansfontein, about 3¾ miles N.N.W. of Durbanville, samples 27 and 28 were taken, the former from a hill-side, the latter from low lying ground. No. 29 was collected from a hill-side at Rondeboschjesberg, 4½ miles N.N.E. of Durbanville, and Nos. 22 and 23, from the farm Phesante Kraal, somewhat over three miles N.N.E. of the village: of these two soils, the first was taken from a hill slope, the second from a valley, No. 24 being taken from the same farm further east. Two soils were collected on the farm Eversdal, about 1¾ miles from Durbanville.

On most, if not on all, of these farms, the principle of applying manure in accordance with the needs of the soil and crop seemed to be entirely ignored: to the land adjacent to the homestead farmyard manure was, as a rule, applied, while guano was carted to lands at greater distances, or in less accessible localities, hillsides, for instance. It was all a question of convenience. Only in one case, that of the farm Phesante Kraal, was the use of artificial fertilisers practised. Thus sample No. 20, although a virgin soil, represents a type usually worked with farmyard manure, and No. 21 one on which guano is employed; and it is a remarkable fact that the lands represented by this latter sample were overrun with *Rumex acetosella*, or Steenbok zuuring, as the farmers call it, from which noxious weed No. 20 was entirely free. There were general complaints amongst agriculturists with regard to the trouble caused by this weed, and its marvellous persistence on certain tracts, and absence from certain others seemed to be worth investigation.

In the more northerly portion of the Division, commonly known as Koeberg, samples were taken from valleys on each of the farms Ongegund and Vissers Hok, and one from the top of a small hill on the Crown land (outspan) north of Vissers Hok. Two virgin soils were collected from hill sides on the farm Hooge Kraal, No. 33 being found by experience to be the more productive of the two. Kraalbosch—considered locally to be a sign of richness of soil—grows on the soil represented by No. 33, which is thought to be the best soil on the farm. It is a looser soil than No. 34, the latter being more stony and apt to cake when the ground becomes hard and dry: No. 34 is, however, more typical of the average Koeberg soil. No. 35 was taken from a valley on the farm Klein Olifants Kop. Of the three soils collected on the farm Uitkyk, it must be noted that the first two, in common with practically all other samples collected from this Division (with the exception, that is to say, of Nos. 1 to 10, 13, 14, 17, 18, 19 and 39) represent absolutely virgin soils, never yet cultivated, dug over, or touched by manure, No. 37 being in the occupant's opinion, the worst, and No. 38 the best ground on that particular farm. No. 39 was a sample of cultivated ground adjoining No. 38, and exactly similar thereto in nature. The analyses afford some clue as to the basis of the farmer's differentiation between these two soils: that which he described as the best soil on the farm is finer in grain than the poorer soil; it is more tenacious of moisture, contains a larger proportion of organic matter, and

more potash; it has more than double the reserve of lime, and nearly six times the amount of phosphoric oxide. The cultivated soil alongside the richer of these two had apparently been exhausted of half its reserve stock of phosphoric oxide.

Klein Dassen Berg, from which the virgin soil No. 41 was collected, is not a grain farm, cereals being grown in quantity sufficient only for home consumption. The arable land of the farm is a sandy loam. The farm is subject to the inroads of blown sands from the west coast. The farm Lange Rug lies on the boundary of the Koeberg clays and the sandy soils of the coast: sample No. 42 is a sandy clay from that farm.

Of the 42 soils described above, the last 36 may be said to summarise the grain lands of the Cape Division; Nos. 7 to 24 affording an excellent representation of the grain farms surrounding Durbanville, while the remaining eighteen are typical of the Koeberg grain district.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
43.	Cape Town.	Molteno Reservoir.	—
44.	,,	Government Avenue.	—
45.	,,	Table Mountain.	—
46.	,,	,,	—
47.	Sea Point.	—	W. Gilmore.
48.	,,	—	J. M. Stephen.
49.	Robben Island.	—	—
50.	Newlands.	Fernwood.	H. Meyers.
51.	,,	,,	,,
52.	,,	,,	,,
53.	,,	,,	,,
54.	Wynberg.	Kenilworth.	B. H. Holland.
55.	,,	,,	D. E. Hutchins.
56.	,,	,,	,,
57.	,,	Cape Flats.	,,
58.	Diep River.	Tokai Forest Plantation.	—
59.	,,	,,	—
60.	,,	,,	—
61.	,,	,,	—
62.	,,	,,	—
63.	,,	,,	—
64.	Downs No. 1.	Princess Vlei.	C. E. Pillans.
65.	,,	Uitvlugt.	—
66.	,,	,,	—
67.	,,	,,	—
68.	,,	,,	D. E. Hutchins.
69.	,,	,,	,,

Sample 43 was taken from the escarpment on the upper side of the Molteno Reservoir. No. 44 was taken from a locality in the Government Avenue, Cape Town, where the oak trees were dying off. The cause of this was obvious: there was a fair amount of lime and potash in the soil, which was also well stocked with Nitrogen, and although it was very poor in phosphates, this did not afford an adequate solution of the difficulty, which appeared to be physical rather than chemical, and exactly illustrates the closing sentence of Mr. A. D. Hall's remarks quoted on page 176. The soil was a stiff bluish clay, and exhaled a distinct sour odour when fresh and moist: the acidity was found to be ·06 per cent., calculated as oxalic acid. *In situ* it was a stiff, damp clay, and this fact, coupled with the presence of much organic matter, and the lack of aëration in the soil, undoubtedly accounted for the ill effects observed.

From the top of Table Mountain samples 45 and 46 were collected: they were, of course, typical Table Mountain sandstone soils. Practical experience had declared the soil there to be extremely poor; in fact, according to the Conservator of Forests, it has been found that only Pines and Acacias flourish on it, and that on a larger scale only the cluster pine has been successfully grown. Even this tree failed when planted on the soil represented by No. 46, although on No. 45 it grew well: this was attributed to the fact that the latter had the better subsoil of the two.

Two soils were collected from private gardens at Sea Point. One of these, No. 47, was taken from the surface of a piece of ground that had been trenched to a depth of three feet for the cultivation of vines: here, as in the case of the Parliament House garden soil, No. 6, several lots were taken from various parts of the area intended to be cultivated, and a thorough mixture made.

Many of the soils in the last list were collected with the idea of obtaining some information relative to the chemical composition of forest soils, and of areas proposed to be afforested. Thus, one sample was taken from the site of a projected tree plantation at Robben Island. This soil, No. 49, yielded a rather small amount of potash, but the phosphate of lime present in an available condition was unnaturally large in quantity; as this was hardly to be expected in so sandy a soil it appeared to point to the presence of a great deal of bone material: the sample was thereupon examined microscopically, and quantities of minute fragments of bones were found therein.

Four samples were collected at Fernwood, Newlands, and one, No. 54, was taken from a garden at Kenilworth: of these, Nos. 50, 51, and 53 had been under cultivation in former years, but not latterly, while No. 52 was meadow land which had been quite recently broken up. These five soils practically all lack potash and phosphates.

Two samples of Cape Flats clays, Nos. 55 and 56, were collected on the Wynberg Flats, near the Kenilworth Racecourse: of these, No. 55 was a white kaolin or China clay, and the other a plastic, dark coloured clay, which occurs, in a thin layer, above the kaolin. These beds of pure white kaolin underlie an extensive area of the Cape Flats sands; apparently, however, these Cape Flats clays do not extend very far east of the railway line. Sample No. 57 represents a similar white clay, which forms the subsoil of the forest plantation on the Wynberg Flats.

Nos. 58 to 63 represent red Constantia loams, and were collected from the Eucalypt arboretum at Tokai. The arboretum comprises several plots, containing not less than 40 six-year-old trees each, and, although never previously cultivated, the area was in former times probably overgrown with Leucodendron (Silver tree) and Mountain bushes.

One sandy soil was collected from the vine plantation lying south-east of Princess Vlei. The peculiar characteristic of this soil, and of a large area whereof it is typical, is that stone fruits are not found to do well, whereas apples and pears thrive upon it.

The clay underlying the Government Forest Plantation at Uitvlugt is represented by samples 68 and 69: these typify the portions of the estate where the tree growth is finest, No. 68 being a yellow and No. 69 a white clay. Nos. 65, 66, and 67 were sands from the Epping Forest at Uitvlugt, a Government plantation on one of the poorest parts of the Cape Flats, where an area of about 4,000 acres has been planted with Cluster Pine and Wattles.

A map of the Division, indicating the areas whence the soils above described were collected will be published in the October issue of this *Journal.*

The results of the analyses of the soils from the Cape Division are tabulated below:—

(Method I.)

No.	Percent. of field sample.	Percentage of soil sifted through 1 mm. sieve.				Percentage of soil sifted through ½ mm. sieve.		
	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	31·8	·42	1·87	·024	·042	·022	·016	·015
2.	71·7	·93	3·99	·034	·111	·046	·046	·078
3.	91·1	4·36	16·77	·068	·319	·030	·059	·066
4.	61·8	1·36	4·10	·034	·014	·012	·033	·023
5.	57·3	·60	2·59	·033	·042	·014	·021	·017
6.	62·2	2·93	5·44	·0113	·120	·532	·129	·095
7.	98·3	—	—	—	—	·080	·028	·024
8.	82·7	—	—	—	—	·088	·017	·027
9.	96·8	—	—	—	—	·086	·015	·024
10.	94·1	—	—	—	-	·160	·062	·028
33.	82·1	1·78	4·23	·0084	·448	·608	·887	·046
34.	82·4	1·33	4·09	·0142	·532	·107	·551	·035
43.	96·0	1·14	8·47	·0304	·014	·008	·011	·065
47.	66·8	2·36	7·46	·012	·103	·194	·359	·139
54.	82·4	5·76	14·97	·001	·189	·042	·010	·063
55.	57·1	1·02	8·47	·0106	·043	·086	·015	·176
56.	84·5	2·11	6·82	·0035	·057	·122	·008	·033
58.	63·0	2·28	6·77	·0057	·071	·018	·050	·046
59.	67·6	3·01	6·80	·0152	·057	·020	·047	·049
60.	63·5	2·07	7·40	·0304	·050	·024	·037	·040
61.	50·7	2·19	8·43	·0142	·078	·012	·047	·036
62.	45·2	1·96	8·31	·0230	·057	·030	·041	·063
63.	50·2	2·25	9·29	·0113	·071	·010	·035	·042

(Method II.)

No.	Percentage of soil sifted through 1 mm. sieve.				Percentage of soil sifted through 3 mm. sieve.		
	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
11.	1·33	15·50	·054	·128	·48	·045	·028
12.	2·97	10·52	·057	·201	·64	·27	·028
13.	2·09	6·44	·0091	—	·21	·157	·011
14.	·65	·26	·0090	—	·12	·125	·012
15.	1·37	6·94	·0053	·134	·39	·12	·044
16.	1·75	7·64	·0028	·134	·35	·026	·062
17.	1·05	4·15	·0024	—	·20	·152	·027
18.	1·42	7·49	·011	—	·26	·036	trace.
19.	·69	5·37	·0019	—	·18	·167	·027
20.	1·03	4·60	·021	·106	·23	·14	·028
21.	1·22	6·67	·0074	·134	·25	·27	·019
22.	1·38	5·31	·0021	·089	·23	·043	·044
23.	·63	2·84	·0021	·123	·12	·025	·032
24.	1·12	5·79	·0060	·084	·32	·023	·017
25.	1·61	4·16	·0024	—	·24	·43	·035
26.	·27	·51	·0005	·056	·046	·039	·0038
27.	·70	2·85	·0095	·056	·22	·35	·020
28.	·44	2·11	·0053	·061	·11	·12	·020

No.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
	Percentage of soil sifted through 1 mm. sieve.				Percentage of soil sifted through 3 mm. sieve.		
29.	·94	4·00	·0021	·044	·15	·16	·026
30.	1·19	3·92	·0064	—	·23	·24	·026
31.	1·40	4·35	·0006	—	·13	·071	·062
32.	1·60	2·05	·0026	·061	·061	·070	·019
35.	·81	1·73	·0004	·061	·095	·038	·023
36.	·62	1·64	·0018	—	·061	·036	·017
37.	·96	2·36	·021	—	·067	·065	·013
38.	1·65	4·20	·0016	—	·16	·093	·076
39.	2·04	2·57	·0028	—	·16	·098	·040
40.	·96	2·59	·0013	—	·070	·094	·026
41.	·24	·81	·0015	·035	·061	·021	·029
42.	·84	2·17	·037	·028	·057	·030	·017
44.	4·84	6·81	·053	·154	·186	·111	·008
45.	·92	5·72	·0033	·126	·033	·014	·043
46.	·35	1·89	·0034	·070	·053	·010	·035
48.	1·46	3·20	·021	·084	·154	·215	·013
49.	·78	3·19	·010	—	3·320	·085	3·370
50.	3·78	6·69	·0008	·184	·188	·044	·054
51.	2·86	5·10	·0003	·089	·065	·069	·025
52.	2·66	5·34	·0007	·117	·131	·040	·027
53.	1·82	3·26	·0005	·044	·071	·044	·045
57.	·92	6·41	·0049	·042	·076	·035	·0015
64.	·05	·17	·0010	·049	·024	·011	·012
65.	—	—	—	—	·087	·049	·012
66.	—	—	—	—	·040	·014	·007
67.	—	—	—	—	·046	·016	·009
68.	2·81	5·70	·0113	·07	·226	·028	trace.
69.	1·56	4·11	·0624	—	·130	·0079	trace.

To refer once again to the five samples of soil—Nos. 13, 14, 17, 18, and 19—collected in the Durban and Tygerberg Field-cornetcies, from areas where *Erysiphe graminis* had infested the wheat crops; the analyses indicate that the average composition of the soils from the cultivated lands where the disease had made its appearance was poorer all round than that of the virgin soils from the same locality: *vide* the following:—

	Average composition per cent. of virgin soils.	Average composition per cent. of cultivated soils.
Lime	·291	·194
Potash	·133	·127
Phosphoric oxide	·031	·015

This shows to some extent the soil exhaustion that had taken place: the crops were apparently badly in need of phosphatic material, and it would not be surprising if this had a great influence upon their capacity to resist the attacks of parasitic diseases.

In this connection I may aptly quote Professor P. MacOwan, D.Sc., F.L.S., formerly Government Botanist, who was professionally investigating the fungus disease at the time when the analyses just mentioned were being made. Dr. MacOwan observed:—

"Phosphate of lime is the one thing needful as mineral food for all cereals—wheat, barley, oats, mealies, and rye. Yet, *beginning with a poor supply of it,**

* The italics are my own; notice the small amount of phosphoric oxide in the virgin soils.

there are hundreds of farms where cereals have been taking the phosphate out of the soil every year for a quarter of a century. The inevitable result has come about. Stinted in phosphates, the corn grows year by year more weakly in constitution, stools less, gives lighter ears, gives shrivelled grain. All this is the natural result of phosphate starvation. On such debilitated plants the parasitic fungi and insects make their usual attacks. The plants have so little vitality that they cannot bear the injury and live. Naturally they succumb. The cure is restoring the original percentage of phosphates, to make the land what it was before five and twenty crops had each carried away a share of this element of its fertility."

On comparing the Koeberg soils with those around Durbanville, it will be observed that many of the latter contain more available lime than the former do. The reason hereof has not yet been investigated: the underlying rock being in both cases of the same nature, it appeared improbable that this could have anything to do with the variation. Possibly the larger proportion of lime in the more southerly soils was due to the finely divided particles of blown sea-sand, which extend across the Cape Flats from the southern coast.

(To be continued).

THE SEABURY CATTLE SPRAYING MACHINE.

FOR THE DESTRUCTION OF TICKS, MANGE, AND LICE.

By Chas. P. Lounsbury, Government Entomologist.

The Cape Colony is now and will long remain chiefly a pastoral country, and the problems of the pastoral industries are therefore of deep concern to the country as a whole. One of these problems is that of tick destruction. Though ticks are recognised as pests of much importance in many sections, it is doubtful, even where they are most prevalent, if one farmer in ten really gives them full credit for the losses, direct and indirect, which they inflict. Ugly sores, permanent injuries to the udder, lameness, and other bodily effects which are obviously due to their attack attract attention, and the frightful drain of blood may be vaguely realised, but scant consideration is given to the effect on the general health brought about by the pain and irritation which they cause, and the fact that they are the natural channel through which many diseases are transmitted from animal to animal is apt to be lost sight of. Heartwater in cattle, sheep, and goats, redwater and East Coast fever in cattle, biliary fever in horses, and malignant jaundice in dogs, have all been shown to be transmitted by ticks in this country, and it is extremely doubtful if they are ever transmitted naturally in any other way. Any advance in methods for the destruction of ticks, therefore, should be of much interest; and the immediate object of this article is to introduce to notice here an apparatus for spraying cattle to kill ticks and other skin parasites that has recently come into use in the United States. The illustration herewith gives an idea of its general construction. Briefly, the apparatus consists of a powerful machine pump in connection with a tubular, sheet-iron spraying chamber of sufficient size to admit the passage of an ox. Modified machines are made for the treatment of sheep, and of hogs. The chamber is placed at the end of a narrow passage, and the animals to be treated are driven in rapid succession through it. As they pass they become deluged with the spray preparation, which plays continuously from many nozzles. The first machine was made about three years ago, and was named after Dr. Seabury, the State veterinarian of Wyoming, who suggested the idea. Soon a company was formed to manufacture and push the use of the apparatus, and it is now doing business under the name of "The Seabury Live Stock Spraying Machine and Manufacturing Company," with headquarters at Denver, Colorado. The rights of the company are protected by patents in this and other countries. No small part of its American business is the spraying of large herds of cattle under contract, for which purpose paid operators take machines from farm to farm. Machines are not sold outright as a general practice. For use in railway stock yards,

they are leased on agreements requiring the payment of a fixed royalty on each beast treated, while for private use on farms they are rented for a term of years.

When in America last year, the writer visited the company, and was shown an installation at the Denver Stock Yards. The sheet-iron chamber was about nine feet long, six feet high, and three feet across at the widest part. As the bottom was quite narrow a beast had no chance to turn when once in. Round about the interior wall terminated twenty-two branch pipes from the pump, arranged in several series from front to rear, and each covered with a screw cap for a nozzle. The outlet from each cap was a single slit about an eighth of an inch wide and an inch and a half long. Some of the caps were placed so as to throw the liquid upwards, others sidewise, and others downwards, and most at the same time to throw it somewhat to the rear—that is, in the direction from which the animals approached. The pump in this installation was a two-inch centrifugal one, driven at 1,200 revolutions a minute by a 14 h.p. gasoline engine. An 8 h.p engine was said to be sufficiently powerful and the size generally employed. Forty pounds pressure is ordinarily maintained. The liquid for spraying was contained in a tank beneath the chamber, and that not taken away by the animals found its way back again at once. The pump is kept running continuously during operations, and so dense is the spray that one cannot see through the chamber. Each stream on escaping from its slit flattens out into a fan-shaped sheet, and if there is nothing to impede it, is dashed violently against the opposite wall. The writer had planned to arrive at Denver in time to see a mob of cattle sprayed, but owing to a delay through a railway accident he missed the sight, and in consequence was unable to verify the claim that every particle of the body of an ox gets thoroughly wetted. However, the pump was started up for his benefit. It is said that the animals go through the chamber as readily as they enter a dipping tank, and that though the work proceeds as rapidly as dipping, no animal escapes a thorough drenching, the liquid driving under and ruffling up the hair, owing to its heavy force and to the angle at which it is projected, and striking hard against the skin. The parts sheltered by the thighs and shoulders are said not to escape, as the animals are on the move. To term the operation "spraying" is understating the case; the animals are really deluged. And whether or not the inside of the ears, any folds of the skin, or under parts often escape being wetted, the work would appear to be immensely superior in thoroughness and rapidity to handspraying. Five hundred cattle are said to have been put through in half an hour, and four thousand in seven hours, but, of course, it should not be supposed that the work ordinarily proceeds at such a rate. The wilder the cattle the easier it is to do the work quickly. Occasionally an animal gives trouble. Then, at Denver, in stead of any poking, beating, or biting of the tail, the beast is stimulated to move on by being given an electric shock through the rump,—for which purpose a prod with suitable connections is kept in constant readiness. The average amount of liquid pumped for each animal is understood to be about eight gallons, and about one quarter of this quantity is carried away; the rest flows back into the tank.

The machines can, of course, be used with any cattle wash; but until very recently all the work done by the company has been with crude mineral oil diluted with water. The oil used comes from Beaumont, Texas, and is a grade that registers $22\frac{1}{2}^{\circ}$ to 28° on a Beaume gravity scale. In the early work a mechanical mixture of four parts of water to one part of oil was applied, but now an emulsion with soap which contains the same proportion is used in preference. The chosen grade of oil contains about 40 per cent. of light volatile products and about 60 per cent. of heavy

products, that are slow to evaporate. The light ingredients, which include what is known as paraffin in South Africa, are supposed to kill the parasites; while the heavier ones keep the skin and hair greasy, and thus deter the attack of new-comers. Some of the oil is said to remain for six to eight weeks.

The apparatus has been developed, and thus far chiefly used in parts of the country where there are few or no ticks, the object in treating the animals being the destruction of scab and lice—from which pests there has been an enormous amount of trouble in the Western States of America. Scab is now a proclaimed disease under the cattle movement regulations of the National Government, and infested animals shipped from one State to another must be sprayed or dipped. One treatment under Government supervision is recognised as efficient if oil is employed, but two are required if lime-sulphur or tobacco dips are the cleansing agents. The Seabury Company claims that, altogether, about 150,000 head of cattle were treated by their machines in 1906, and over 300,000 in 1907. The spraying is said to be of considerable incidental benefit to the cattle owing to the coating of oil acting as a deterrent to flies. Cattle in America are tormented by several kinds of flies unknown in South Africa, and notably by the horn fly, a species which settles in vast numbers at the base of the horns. The relief from the attack of these pests is said to enable the oil-sprayed cattle to lay on flesh in the spring much more rapidly than unsprayed cattle. The oil also has the effect of hastening the fall of the winter coat of hair, and hence after a few weeks in spring sprayed cattle present a much better appearance than unsprayed ones. Then again many ranchmen claim that the oil coating is a valuable protection in the case of cold rains.

Such spraying as had been done against ticks was stated by the Company's officials to have been an unqualified success. A letter from one Texan ranchman was shown to the writer in which it was written:

> "In regard to the cattle I am very well pleased. I had no loss at all, and the ticks were all killed. The cattle looked very clean after thirty days. The hair looked slick, and had a nice, healthy appearance. The ticks started to get on to the first bunch of cattle—after two months, but they did not get on my steers in the pasture—before turning them out, which was about three months. The machine does the work perfectly, and gave me perfect satisfaction."

The tick concerned in this case was undoubtedly the common cattle tick of Texas, a species almost identical with the common Blue Tick of South Africa. Very likely the specimens seen after two months were adult females, and if this were the case, young ticks must have been present three weeks earlier. Another letter stated:

> "Two of my neighbours have prairie dogs on their ranges. Hence ticks are in their cattle's ears. The one who sprayed has not a tick in his herd,—so he informs me, and I believe him reliable. The one who dipped in the lime process has all the ticks he started with."

The ear-attacking tick referred to is a species closely allied to the man-attacking tampan of the warmer parts of South Africa. In a letter received by the writer subsequently to his visit, the Company wrote:

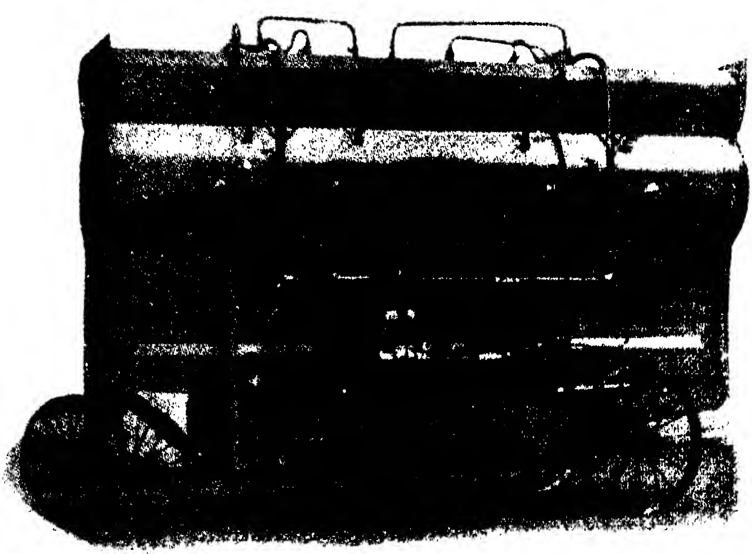
> "The majority of the work we have done has been for mange and lice, although last year we made some twenty odd experiments under Government supervision below the quarantine line for fever ticks on animals infested with the Texas fever tick. In all of these experiments it proved that 20 per cent. oil and 80 per cent. water under agitation would thoroughly destroy the fever ticks, and as evidenced by the letter enclosed it would keep the ticks from coming back on to the animals for about two months."

The letter referred to was the first one quoted from above. The Company was confident that its machine would prove entirely satisfactory in South Africa were it introduced, and expressed the conviction that Beaumont oil emulsion, machine applied, would prove preferable as a remedy for ticks to our arsenical dips. At the time, Messrs. Wm. Cooper & Nephews, of Cooper's Dip fame, were negotiating for South African rights on the apparatus; and quite recently, after a delay of many months, the firm secured a complete outfit. The plant will first be set up near the firm's dipping tank at Gonubie Park in the East London district, and exhaustive experiments will be made to determine the relative merits of its use compared with dipping. Under the circumstances, it seems at present unnecessary to discuss its probable advantages and disadvantages under the conditions occurring in this country.

A few hand spraying tests made on four stabled cattle at the Rosebank Experiment Station clearly indicate that power machine spraying must be vastly superior to hand spraying, or else that Beaumont oil is a much less effectual destroyer of ticks than the letters quoted above, and information given in disinterested official American publications, would lead one to believe. The oil used was some kindly supplied by the Cooper Company from a special importation. It was found to have a specific gravity of 0·906, which is about equivalent to a reading of 25·2 on the Beaume scale, and hence is assumed to be of a suitable grade. Only the ordinary Blue Tick was present on the sprayed cattle. All the sprayings were made with a "Success" bucket pump with paraffin attachment and "Bordeaux" nozzle, and fully three imperial gallons were applied to each beast. The first were sprayed either with 20-22½ per cent. of oil mechanically mixed—to get which the oil gauge had to be set at 30 per cent. owing to the thickness of this oil, or with 20 per cent. in a well-made, soap powder emulsion. There was no noticeable difference in action between the mixture and the emulsion on either the ticks or the cattle. The temperature of the animals was abnormally high for about a day, and very slight inflammation showed on some tender parts, but otherwise the animals seemed uninjured. Examination of the ticks was made difficult by the slimy coating of oil which clung to the hair. Many hundreds of male ticks were present, and almost without exceptions these perished. The destruction of newly-moulted females, too, seemed practically perfect, but nearly all of the females that had become much distended escaped. Not one in twenty of those fully distended were dead on the following day, and that the destruction of the young ticks was not complete was shown by the appearance of some engorged females for over a fortnight afterwards. About 300 engorged females were pulled on the day after the spraying, and about 100 more on the fourth day after; and despite their greasiness, which was probably increased by the handling of them, these ticks started to lay in a normal manner when they were placed over earth. Somewhat over one-half of them lived their full time and laid full complements of eggs, while the rest died off prematurely after laying a portion of their eggs. The first eggs were hatching before the mortality from the oil had ceased. That the dying-off was due to the oil was clear, as all the sprayed lots behaved similarly, while control lots, taken just before spraying, remained quite healthy. Although the animals were kept stabled, it took less than a fortnight for all traces of the spraying to disappear from most parts of the body. The middle of the back, especially above the shoulders, remained greasy longest, while the legs and dewlap quickly became clean. For three or four days most parts of the body were distinctly oily. At the end of a week there was merely an oily feeling to the hair—as if a little hair oil had been rubbed well in, and after ten days this oiliness was only feebly apparent, except along

the ridge of the back and above the shoulders. Immense numbers of larval Blue ticks applied during the first four days perished in the hair, yet some dozens out of the tens of thousands applied did come to full maturity. Larger numbers of a lot applied six days after spraying escaped destruction, but it was evident that the vast majority perished owing to the oil on the hair and skin. Applications made on the fifteenth day, however, yielded as good crops of mature ticks as would have been expected in the case of unsprayed cattle.

Later tests were made with 30 per cent. of oil mechanically mixed with water—the same cattle being sprayed when the ticks applied on the fifteenth day were maturing. The effects were little better than when 20 per cent. mixture was used. On this occasion Bont Tick nymphs were applied to two bulls on the fourth day, the ticks being placed in a bag tied over the scrotum. Perhaps the ticks would have fared worse had they been applied to some other part, but the fact remains that they bit well and fed to repletion. Bont larvæ were applied to one of the bulls, also on the scrotum, on the seventh day, and these, too, fed as if on an unsprayed animal These results are disappointing, but as suggested above, the same preparations might prove far more efficacious if applied by the Seabury apparatus. Although the animals were very thoroughly sprayed in the tests, it was observed that the oil and water appeared to separate very quickly, and it seems not improbable that much of the oil never penetrated, but lodged on the outside of the hair, and dripped off. Under the much heavier pressure obtainable by the apparatus, far more of the oil might be forced amongst the hairs and retained.



The Seabury Live Stock Spraying Machine. Patented in the United States and Foreign Countries.

TUBERCULOSIS IN ANIMALS AND ITS RELATION TO PUBLIC HEALTH.

By W. Robertson, M.R.C.V.S., Director of the Veterinary Laboratory, Grahamstown.

The discovery of Bacilli and the improved methods now used for their demonstration has probably done more to advance and simplify the Pathology, Treatment and prevention of Tuberculosis than any other of the many organismal diseases.

History.

Tuberculosis has been known for centuries, and received its name from Schonland about 1830, being a higher developed form of the term Tubercle. As scropulous lesions in man and beast are now considered Tubercular in nature, to Pliny and Hippocrates must be given the credit of being the first writers on this subject. Old pathologists used the term Tubercle in its etymological sense—a small tumour—this meaning and nothing more being retained until the early part of the past century.

Professor Nocard says: "It is most unquestionably the disease of animals to which the agriculturist of all countries pays the heaviest tax; it alone causes more ravages than all the other contagious diseases put together (this is in Europe)."

In Europe as a whole the percentage of animals proved Tubercular on slaughter runs from 9 per cent. to 30 per cent., and as the Professor adds, "and it is not the visibly affected and the worst cases that are sent to the public abattoirs"; and although we have no such data in this country, the disease is believed to be common.

In the course of the crusade against Pleuro Pneumonia (Lungsick) in England (which only stopped with the eradication of the disease) during the years 1891-92, 13,880 animals were slaughtered and 2,055 were found to be Tubercular (14·88 per cent.). The animals were of all ages and from all parts of the country, and at the British Congress of Tuberculosis held in London, 1902, one of the most experienced inspectors in England stated "from 30 to 40 per cent. of the cattle in England were Tubercular," and Nocard stated "in Sweden, Tuberculin applied to 36,000 cattle has revealed a reaction in 42·2 per cent."

America is as seriously affected as Europe. In New York Blaine examined 4,000 cattle, of which 21 per cent. were Tubercular. In certain districts of Massachusets, Osgood found them up to 80 per cent. Out of 17,000 animals submitted to the Tuberculin Test, 9,500 reacted (55 per cent.).

In the Argentine Republic, the disease, which is very rare in the country-bred stock, attacks from 3 to 10 per cent. of imported animals, and the same may be said of Chili, where the percentage rises to 30 per cent. amongst pure or cross-bred shorthorns.

In Australia 10 to 20 per cent. of the animals killed in the slaughter-houses of Victoria were Tubercular (Nocard), Japan estimates 58 per cent. amongst imported stock, and, worst of all, this disease is increasing in severity in its old habitats, and gradually spreading over all the countries and States of the civilised world.

Madagascar cattle are badly affected with the disease—to what extent *re* percentages I do not know. South Africa has up to the present been remarkably free from this malady in her grazing herds, but there is a great deal more Tuberculosis amongst our dairy herds in the Western Province than the public are aware of, and with the importation of fresh stock of pure breeds, the housing and improvement in the stamp of all cattle, it behoves us to be very careful in regard to the kind of fresh stock we import.

Although Tuberculosis attacks most animals (Professor MacFadyen used to declare that it was just a question of "manner of infection," and that all mammals could be infected, from man downwards), it is with the disease in our ox tribe that I will deal, as this is the species on which the disease levies the heaviest toll, and from which we ourselves are most likely to become infected, viz., by the ingestion of infected meat and milk.

The disease in man and animals has been known from remote periods of history, and many legislative and sanitary measures have been introduced in endeavouring to cope with the malady and check its course.

It appears in cattle in every part of the civilised world (and I have seen several cases in this country in imported stock killed at the port of entry), and under many names. At one time it was believed to be identical with syphilis in man, and stringent measures against the use of meat and milk were enforced.

During the past twenty years our knowledge of the disease has greatly increased; it is now generally accepted that there is a distinct connection between the disease in man and animals, and that the disease in animals can be transmitted to man and *vice versa*.

A great deal of interest is being taken in the disease in various parts of the world, and most States have framed more or less comprehensive sets of regulations dealing with the matter.

Tuberculosis, as stated, is an infectious disease, that is, one animal suffering from the disease can infect another; the degree of infectivity possessed by the Tubercular animal varies with the stage of the disease and with the parts involved. For instance, an animal very slightly affected (*i.e.*, with only a small portion of one lung diseased) might stand alongside clean cattle for a very long time and not transmit the disease; while another cow which was literally coughing up pieces of her lungs full of the causal Bacillus would spread the disease right and left. In a similar manner, a cow suffering from Tuberculosis of the lungs would not be so likely to yield infected milk as her neighbour who had a nodule or tubercle in the udder.

Naturally infection is by these channels in the case of bovines:—

By Ingestion, i.e., eating contaminated food or in any way getting the Tuberculosis Bacilli into the digestive tract. In this case we should look for lesions in the Liver, Intestines, Spleen, and Mesenteric Glands.

By Inhalation.—Breathing air contaminated with the Bacilli. Generally the discharge of sputum (saliva) run from the nose or mouth of an animal the subject of Tuberculosis. This dries and rises as dust, being inhaled by other animals. In a case of infection by this channel we would expect lesions in the Throat, Tonsils, Lungs, and Glands at the base of the Lungs.

During Copulation.—A Tubercular bull or Tubercular cow may communicate the disease to each other. Here we should find lesions in the urino-generative apparatus.

The disease is most commonly seen in animals under confined circumstances, but quickly spreads among cattle kept in the open when once introduced. It was once rare in the herds of Australia, and is now common; the same might be said of Argentina in a lesser degree.

Tuberculosis is rare amongst the hill cattle of Scotland, such as the Aberdeen Angus, or amongst the wild cattle at Chillingham Park, but I think the statement that there are few—if any—clean herds of pure-bred cattle of 30 years standing in England is now generally accepted as representing the true state of affairs.

Heredity.

Tubercular cows generally give birth to clean calves, which quickly become infected, no doubt by the mothers' milk. It seems impossible for the Bacillus to pass from mother to foetus in the uterus (womb). A few calves may be born affected (Bang says ·33 per cent.), but what is transmitted is the predisposition to the disease.

It is a common saying when a person (of consumptive ancestry) develops pronounced symptoms of Consumption or Phthisis, that such is not to be wondered at, as the person's father or more distant relative died from the disease, and that they are a consumptive family or have the phthisical taint. So by this predisposition to disease is meant a certain weakness in the tissues to resist the attack of the Tuberculosis Bacillus, and one of the greatest causes of this weakness is *inbreeding*, seen to perfection in certain pure-bred herds of Ayrshires, Shorthorns, etc. The infection in the case of Tuberculosis is not to be compared with that of Rinderpest, Anthrax, or Foot and Mouth disease.

In all these diseases the slightest contact with an animal attacked or even by objects tainted by it is enough to cause contamination. In Tuberculosis, on the contrary, it is only after some time, the result of repeated contact—such as close stabling or the ingestion of infective material—that infection results. This allows us to understand why the spread of Tuberculosis is somewhat slow in pastures, but when one has the misfortune to introduce into a stable a Tuberculous cow, and this cow remains there, the cowshed cannot escape infection, and the inmates, with rare exceptions, become Tubercular one after the other (Nocard). Many things favour the Bacilli in their attack, insanitary conditions, overcrowding, bad ventilation, absence of air, light, or sun, feeding upon bad food, forcing the production of milk—in fact, any treatment likely to lower the vitality of the animal.

Nature of the Disease.

It is a disease due to Bacillus. The Bacillus of Tuberculosis was discovered by Professor Koch in 1882. It is one of the smallest of the Pathogenic (disease producing) Bacilli, and is a small, slender rod, about one or two thirds the diameter of a red blood corpuscle. The Bacillus is what is termed a tissue parasite in contradistinction to a blood parasite (like Anthrax), so instead of a general disturbance of the constitution, we find in Tuberculosis the lesions more circumscribed and in the form of nodules or Tubercules. If any Bacilli do enter the blood stream they are quickly caught in the lungs. "When the Bacillus has become caught in any organ—such as the lungs, liver, spleen, or any of the glands, such as those of the mesentery, or at the base of the lung—it begins to multiply, and then causes an irritation in the tissues around it, which leads to the formation of the so-called Tubercle, whence the general name of the disease Tuberculosis."

The nodule in the lung is frequently very small at first—about the size of a millet seed—and when in this condition is hard, firm, and yellowish white in the centre. If in the lung, the nodule is surrounded by a zone or area of congestion. In a short time disintegration or breaking down of the central tissue of the Tubercle commences, the centre becomes soft, white or yellow in colour, and of the consistency of cheese—*i.e.*, *caseation* takes place.

The Tubercles may now dry up, and become simply hard knots of fibrous tissue, or they may increase in size, several coalescing and forming masses of caseating tissue the size of an ostrich egg. In a bad case the whole of the lung may be in a broken-down condition, and, in fact, useless; the heart may be surrounded by a huge mass (several pounds in weight) of stinking creamy pus; the glands in the intestines may be the size of eggs, and hard and yellow on section. If the udder is affected, the lesion will be hard, firm nodule of varying size and hard on section, with white or yellowish points scattered through the surrounding substance. In old nodules you find gritty particles, due to the deposit there of Lime-Salts.

Symptoms of Diagnosis During Life.

The general effect of the disease on the body is at first slight, therefore the diagnosing of a case of Tuberculosis by ordinary examination is difficult, and often impossible, and the symptoms will frequently vary in type with the sets of organs most involved, and in severity with the extent of the disease.

As regards the frequency of Tuberculosis of the different organs, the following statistics serve as a guide:—

	per cent.
Tuberculosis of lungs and serous membranes... ...	41
Tuberculosis of lungs alone	33
Tuberculosis of serous membranes alone	17
Tuberculosis of other organs	8

By serous membranes are meant the lining membranes of the chest and abdomen. Tuberculosis of such is usually known as pearly disease or grapes, from the tubercles under the shining membrane resembling pearls.

It will be seen from the above table that the contents of the chest are most frequently the seat of Tubercular lesions, in bovines furnishing us with 75 per cent. of cases; and it is to the disturbance of these organs that we must look during the life of the animal to help and guide us in our clinical examinations in cases of suspected Tuberculosis. The following description of the disease is taken from a Swiss Sanitary Order:—

A dry, short, interrupted hoarse cough, which the sick animals manifest, especially in the morning at feeding time, still more after violent exertion. At first these animals may improve, continue to thrive, and even lay on fat when well fed.

As the disease progresses they grow thin, and show more and more the appearance which indicates diseased nutrition, such as a staring, lustreless, dishevelled coat; dirty, tense skin, which appears very pale in those regions free from hair. The temperature of the skin is below normal. The loss of fat causes sinking of the eyes in their sockets. They appear swimming in water, and their expression is weak.

The cough is more frequent, but never, or very rarely, accompanied by discharge.

The animal continues to lose condition, even with plenty of food and a good appetite, so that in a cow the quantity of the milk yield is small.

Intestine of Fowl showing Tubercular disease.

Rib from case of Tuberculosis in a Cow. Inner side showing the masses of Tubercular growths called grapes.

Liver of Fowl showing Tubercular nodule or lump.

Section of Lung showing Tubercular masses.

Section through Tubercular Liver of Dog.

At times in the later stage of the disease the animal manifests considerable tenderness when pressure is applied to the front and sides of the chest.

The constant symptoms are a cough and continued emaciation, despite good appetite and food.

The Tuberculin Test.

But if we had to trust to our clinical diagnosis and our unaided eye, ear, and hand, it would, as a rule, only be in the last stages of the disease that we could with certainty pronounce the animal Tubercular. I have seen fine, fat sleek bulls showing not a single appearance of disease reveal the most extensive lesions of Tuberculosis on slaughter, and it is in such cases as an aid and help where the eye, etc., fails that the Tuberculin Test is of such value.

The discovery by Koch in 1890 of the production of fever indicated by a rise in temperature in Tubercular animals into which he injected a sterilised glycerine extract of pure cultures of Tubercle Bacilli, while it produced no effect whatever when the animals were free from that disease, furnished us with a simple, but very reliable diagnostic agent.

This substance *Tuberculin* bears the same relation to Tuberculosis as *Mallein* does to glanders, and is a clear, cherry-coloured fluid, prepared by cultivating the causal organism of the disease (the Tubercle Bacillus) in a meat broth containing peptone and glycerine for a period of six weeks, killing the Bacilli by heat, evaporating and filtering the remaining liquid and finally adding a small percentage of pure Carbolic Acid to prevent putrefaction.

This preparation keeps for a considerable time. The quality of the Tuberculin depends upon the vitality and virulence of the Tuberculosis Bacilli from which it is prepared. Tuberculin can be (and sometimes is) produced which is of no more value, as a diagnostic agent, than so much water.

This Tuberculin—the product of the growth of the Bacillus Tuberculosis in broth—when injected into a healthy animal produces no results, either local or general, *i.e.*, there is no swelling at the point of inoculation and no rise in temperature, whereas in the case of a Tubercular animal there may be a swelling at the seat of inoculation, and there is always an elevation noticed in the bodily temperature twelve hours after inoculation. In the hands of competent men Tuberculin makes few or no mistakes. This opinion is very general throughout the countries of Europe, Australia, and the Americas, and was voiced strongly by the representatives who met together at the British Congress on Tuberculosis in London in 1902.

Charges have been brought against Tuberculin:—

1. Cattle which are free from Tuberculosis have reacted to Tuberculin.
2. Cattle which are found on slaughter to be affected with Tuberculosis have given a negative reaction to the test.

The first charge is not based on facts. The verdict of "Free from Tuberculosis" after *post-mortem* on a reacting animal may be due to an inability to find the lesion, which may be very small and minute, say, in the glands at the root of the lung, or a small, hard knot in the udder or testicle. It is a well-established fact that an animal having but the smallest tubercular lesion gives the most characteristic reactions to tuberculin.

The second, "That tubercular animals may show a negative reaction to the Test," is partly true, but when the animal which is affected with the disease fails to react to the Tuberculin Test, we generally find that it (the animal) is in such an advanced stage of the disease that clinical skill,

that is eye, ear, and hand, are sufficient to diagnose its presence The same may be noticed in the case of Glanders; it is a fact that a visibly glandered horse will not give a good reaction to the Mallein Test.

I have seen animals (pure bred stock) landed at the port of Cape Town, fat, sleek, and in perfect condition to the eye. These being killed after reacting to the Tuberculin Test showed lesions of the disease in a most marked degree both to the naked eye and the microscope. By the latter a doubtful naked eye appearance can be verified, as after staining by a special method the characteristic Bacilli of Tubercle can be demonstrated, or a guinea-pig can be infected with a scrap of the suspected tissue.

I have heard the remark that "Tuberculin might give rise to the disease." Good Tuberculin is sterile, *i.e.*, contains no living germs. This result having been obtained by heating and subsequent filtering through a germ-proof porcelain filter, so, as one of the debaters at the Tuberculosis Congress said, you might as well expect to get barley from planting whisky as to produce Tuberculosis by properly prepared Tuberculin.

We are often asked by importers what rise in temperature indicates Tuberculosis?

Given an animal with a normal temperature in a state of mental and bodily rest, I consider that a rise of 2° F. above the highest normal daily temperature due to Tubercle being present.

If an animal react to the Tuberculin test, and be again re-inoculated at the interval of a week, the second reaction will, as a rule, be less than at first, but if the said animal is again and again re-inoculated at short intervals, a time is reached when the constitution is tolerant to Tuberculin, and no reaction follows its injection.

Tuberculin, as Professors Nocard, Bang, and others state, "does not lie, if the material is good and reliable, and the user knows his business." There is no diagnostic agent to be compared to it, yet it is capable of much abuse. This abuse may be intentional or unintentional, the former where direct fraud is perpetrated, by the inoculator giving a false certificate, and the latter when the Tuberculin is at fault and the animal, unknown to the operator, has been subjected to the Tuberculin Test shortly before. That these abuses do exist is certain, and the fact has been recognised by the Canadian Government, who have stationed in America and England their own trusted veterinarians, who test any animals purchased in those countries for importation into Canada.

The Tuberculin employed by this Government is prepared at the Laboratory of the Royal Veterinary College, London, and has given satisfaction whenever it has been used.

Directions for Using Tuberculin.

1. While under the Tuberculin test cattle ought to be kept in the house, fed on their usual food, and protected from draughts. They ought not to be allowed to drink large quantities of cold water between the 6th and 15th hours after injection. It is well to take their temperature at least once on the day preceding the test.

2. The dose of Tuberculin for a medium-sized cow is 3 cubic centimetres, or 50 minims, and it may be varied above or below that, according to the size of the animal. Large bulls ought to receive 4 c.c.

3. It ought to be injected under the skin with a clean hypodermic syringe. The most convenient points are in front of the shoulder, or on the chest wall behind the point of the elbow. The best form of syringe is one with an asbestos piston, as the whole instrument may be sterilised by boiling it in water for five minutes before use.

4. The Tuberculin must be injected into the subcutaneous connective tissue, and care must be taken that the whole dose is introduced.

5. The temperature must be taken at the time of injection, and at the 9th, 12th, and 15th hours afterwards.

6. Animals in which the temperature during the 15 hours following the injection rises *gradually* to 104° or more may be classed as *tuberculous*, and those in which it remains under 103° *as not tuberculous*. When the maximum temperature attained is under 104°, but over 103°, the case must be considered doubtful, and the animal may be re-tested after a month.

7. The test is not reliable in the case of animals in the last stage of the disease, or in those in which the temperature is over 103° before injection.

8. The Tuberculin should be kept in a cool place, and protected from light. Should it become turbid or cloudy, it must not be used.

9. The Tuberculin test does not render the milk in any way injurious.

The regulations under which compulsory testing with Tuberculin previous to entry of breeding stock into Cape Colony is enforced are attached to these notes, and I think stock-owners in this country may congratulate themselves that such regulations are in force.

I have pointed out the common objections to the use of Tuberculin by cattle owners in Europe and America. Professor MacEachean, of Montreal, one of the authorities upon the world's cattle trade, says: "In my opinion, there is not one argument used by cattle owners or importers against its use tenable, and I have never known a single instance of a person owning a *healthy* herd lifting up his voice against it."

The Professor sent a circular to the various cattle inspectors through Canada, asking many questions—suggested by newspaper discussion on the subject—and as these same questions are bound to arise when the application of the Tuberculin test becomes more frequent with the increased importation of breeding stock in Cape Colony, it may not be out of place to give here the questions and answers:—

1. Do you know of any cases in which the use of Tuberculin has produced abortion?

2. Do you know of any instance in which a bull has been rendered impotent by the use of Tuberlin?

3. Do you know of any case in which the general health of the animal has been injured by the Tuberculin test?

4. How many cattle have you tested during the past year?

5. How many *post-mortems* have you seen of animals condemned in consequence of the test?

6. In how many instances did you *fail to find Tubercle*?

These questions, it must be acknowledged, are fairly searching, and strike at the root of the matter.

The replies were all negative to the first three questions; to the fourth they aggregate 22,023 head; to the fifth 579; to the sixth ten and one doubtful.

Professor Leonard Pearson, State Veterinarian for Pennsylvania, states in his report for 1899 that of 4,400 *post-mortem* examinations made, Tuberculosis was found in all but eight animals which had reacted.

Professor MacEachean has made exhaustive inquiries amongst the farmers who have had experience with Tuberculin, and the opinions are strongly in its favour. From these facts we deduce the following:—

Tuberculosis is essentially a contagious disease, and ought to be so classified and acknowledged in every country or State in the world.

It is insidious in its character, and in only a few cases comparatively can it be diagnosed by physical examination, but in Tuberculin we have a safe and reliable test by which even latent cases can be diagnosed.

That Tuberculin is harmless. It does not produce abortion in pregnant cows, impotency in bulls, or in any way produce any injurious effects on animals tested by it.

How to keep a Herd Free from Tuberculosis.

Test all purchased animals with Tuberculin; if bought in England or Europe and America generally insist that previous to shipment the cattle be subjected to the Tuberculin test by a reliable Veterinary Surgeon, the Government Veterinarian of the Port if possible, and refuse all reacting animals, no matter how cheap.

Don't lend your bull to serve another man's imported stock, and don't accept service from his bull for your cows.

If your cattle are housed (dairy herds), see to ventilation and sanitation of the cow sheds generally; sun and light are the greatest foes of the disease.

If you have clean bred housed stock of a kind susceptible to Tuberculosis, do not have attendants who suffer from consumption.

In South Africa the cattle native to the country are practically free.

Argentina, etc., was free until pure bred stock were introduced, and with the rush for European breeding stock for South Africa unscrupulous dealers are certain to try to palm off on the South African buyer some animal which is known to be affected with Tuberculosis, so again I urge the purchase of cattle only under the condition that they pass the Tuberculin test in the country of purchase, otherwise if the cattle arrive in Cape Colony ports minus a Tuberculin certificate, they are quarantined and tested, and if they react killed; thus the owner has all his expense and trouble for nothing.

We have adopted stringent measures to guard against the introduction of diseases from over-sea; we should also make arrangement for the detection and suppression of the disease amongst our existing herds. Now is the most favourable time to act, while the disease is still limited in its extent, and when the cost to the Government and to the owner would be comparatively small.

THE TRANSMISSIBILITY OF TUBERCULOSIS THROUGH THE VEHICLE OF MEAT OR MILK.

It must be assumed that Tuberculosis may be transmitted to man by the consumption of tuberculous organs or milk. For, Tuberculosis of man and animals is produced by a bacillus which, in regard to its form, stainability, growth, and transmissibility to small experimental animals, exisibits no essential differences. Furthermore, it is possible in a proportion of the cases, if not always, to transmit human Tuberculosis to cattle, hogs, and sheep. Finally, a number of cases are known in which Tuberculosis of domesticated animals has been transmitted to man (skin infection from handling tuberculous material, and alimentary Tuberculosis after eating the milk of cows affected with Tuberculosis of the udder).

By means of experiments on animals it has been shown that the tubercle bacilli introduced in food may be taken up by the lymphatic apparatus of the gums and pharyngeal cavity, and that they are also capable of passing through the stomach, and may produce specific alterations in the intestines or mesenteric glands. A necessary condition, however, is that the tubercle bacilli shall be introduced in a certain quantity.

Recently the question of the transmissibility of Tuberculosis of domesticated animals to man has been thrown into doubt by Robert Koch on

the basis of experiments which he carried out in co-operation with Schutz. In these experiments it was found impossible, by any method of inoculating human Tuberculosis, to render cattle, nineteen in number, tuberculous, while, on the contrary, cattle which were inoculated with tuberculous material from other cattle became seriously affected, and part of them died.

Before the experiments of Koch and Schutz, Putz, Theobald Smith, Frothingham, Dinwiddie, and Gaiser had demonstrated the difficulty of transmitting human Tuberculosis to cattle; Koch and Schutz, however, conducted their experiments, in so far as they operated with pure cultures, exclusively with one culture. This is of the greatest significance in judging the results, as was shown by the experiments of Thomassen. He infected four cattle with four cultures of tubercle bacilli of various human origin, and produced positive results in two cases. Furthermore, Karlinski succeeded in infecting cattle with human Tuberculosis in ten cases during twenty-five experiments. Similarly, Bollinger, Kitt, Frothingham, Crookshank, Svennson, Delepine, Arloing, Krebbs, and Rievel, as well as De Jong, obtained positive results in the transmission of human Tuberculosis to calves. We may, therefore, agree with Thomassen when he states that it is difficult, but *not impossible to transmit human Tuberculosis to cattle.*

In the case of hogs and sheep, even Koch and Schutz succeeded in part of their experiments in producing Tuberculosis, if only of a local character, in the experimental animals by means of Tuberculous material of human origin. In hogs and sheep also, Tuberculous material of bovine origin was found to be much more infectious than that of human origin.

The rarity of primary intestinal Tuberculosis in man seems to speak for the soundness of Koch's assumption. The question should not be decided by this evidence, but rather by the occurrence of primary Tuberculous alterations in the laryngeal, cervical and mesenteric glands, which affections appear much more frequently after the ingestion of tubercle bacilli with the food than does a Tuberculous affection of the intestinal mucous membrane. Heller in Kiel recently found that in nearly one-half of the cases of Tuberculosis of children there was an affection of the mesenteric glands. Moreover, Dr. Still, working on material obtained from autopsies in a London hospital for children, found 29·1 per cent. and Dr. Shennan, in Edinburgh, found primary Tuberculosis in 28·5 per cent. of the cases of Tuberculosis in children.

Negative results in the transmission of a given race of Tuberculous cultures of bovine origin to man, as reported by Baumgarten, are not sufficient, according to the results of the experiments by Thomassen and Karlinski, to prove the non-transmissibility to man of bovine Tuberculosis.

In favour of the possibility of the transmissibility of bovine Tuberculosis to man we have the case of Moses, that of Priester, several cases of skin Tuberculosis of animal origin and cases of alimentary Tuberculosis which have been observed in man after drinking tuberculous milk. The Veterinarian, Moses, of a healthy family, received in the summer of 1885, a wound on the left thumb while making a *post-mortem* examination of a tuberculous cow. The wound healed without suppuration, although the point of the knife probably penetrated into the joint. After six months, however, a so-called skin tubercle developed on the cicatrix and the joint became loose. In the autumn of 1886 acute catarrh appeared, and thereupon a chronic hoarseness, and, in January, 1887, death resulted. Priester reported a case, observed in a surgical clinic in Kiel, of skin Tuberculosis in a man who, for the purpose of removing a tattooing of the skin, pricked the tattoo marks and rubbed milk into the punctures. This operation

was repeated several times. Skin Tuberculosis developed in the punctures which were rubbed with milk on a certain day.

Concerning skin Tuberculosis in veterinarians and butchers, which may be ascribed to infection with bovine Tuberculosis, we have the communications of Tscherning, Ravenel, Johne, Muller, in Erfurt, Sick and Ostertag In this connection it should be remembered that skin Tuberculosis can be induced artificially only with some difficulty. Chauveau did not succeed in infecting calves by superficial scarification of the skin and subsequent rubbing-in of the tuberculous material. Similarly, Bollinger obtained negative results by cutaneous inoculation of guinea pigs.

TUBERCULOSIS FROM THE MEAT INSPECTORS' POINT OF VIEW.

As a preface to the following remarks on meat inspection, I would like to say that such a thing is practically non-existent in this Colony. The Jewish people are the rare exception, and it is a noteworthy fact that individuals of that race are freer from Consumption than others.

All animals killed as the trade term it "Kosher," are killed by a qualified slaughter man, and one trained in meat inspection who, after careful examination of the carcass, decides whether he shall affix the seal certifying the meat as killed according to Jewish ritual and also inspected by the proper official.

I have again and again seen meat in this country refused by the Kosher slaughter man which was afterwards sold in ordinary trade. I do not mean by this that the meat in question was unfit for human food, I simply mention the fact to emphasise the care and thoroughness of the Jewish meat inspector. I have seen that official reject carcases quite unnecessarily, and which no ordinary inspector, however scrupulous, dare do; but one can proceed farther when the facts are part of a religious code than when they are governed by ordinary sanitary laws, and if some of the people in this Colony saw how their meat was killed, and frequently what it looked like when it was dead, they would all become strict observers of the Mosaic Law as far as their animal food was concerned.

By the term meat inspection is understood the professional investigation and judgment on the entrails and meat of slaughtered animals with reference to their fitness as human food. In a broader sense meat inspection also includes the examination of living animals before slaughter, which examination is required for a more accurate judgment on the fitness of the meat for consumption. Furthermore, meat inspection embraces the supervision of public and private meat markets as well as of all industries in which meat is manufactured into sausages and other products, for the meat of healthy animals which in and of itself is suitable for consumption may, in consequence of improper preservation or other treatment, become subsequently unfit for consumption by man.

The chief purpose of meat inspection is to protect man against the dangers which threaten him from eating meat. These dangers are of several sorts. The most serious consist in the possibility of the transmission of animal parasites (trichina and tape-worm) as well as of infectious and toxic diseases, Tuberculosis, Glanders, Anthrax, Rabies, Septicæmia, Pyæmia, Meat poisoning and botulism.

Meat may possess the freshest appearance, the most attractive colour and the most wholesome odour, and yet be unwholesome. The dictum of the English statesman Disraeli, "Sanitary Education is Better than Sanitary Legislation," does not apply to the consumption of meat by man.

There is no definite method of preparation by which all the unwholesomeness attached to meat under certain conditions may be removed. The consumer, therefore, can not protect himself sufficiently by private measures. Furthermore, experience has shown that the public even in these cases in which it is possible by observing certain precautions to avoid the harmful effects of eating meat is inclined to neglect these precautions.

The Continental authorities appear to have been the first to take steps in the direction to prevent diseased meat being used for consumption by the human race. In early times the spiritual advisers appear to have acted in the capacity of meat inspectors. In the eighth century, Pope Gregory III. forbade the eating of horse-flesh on the grounds that it caused impure blood and eruptions. Pope Zacharias also forbade the consumption of meat of diseased animals, as it was considered dangerous to health. In 1248, at Basel, a regulation as to the sale of meat in the market was made as follows:—"That they shall sell the cleanest and best meat in the highest and best located parts of the market, and in the common meat booths they shall sell the kind of meat which has been previously sold at such places, while unclean meat, that is entrails, tripe, etc., shall be sold outside the market."

In the Augsburg Charter of 1276, they prescribed slaughtering in public slaughter-houses for cattle, sheep and calves, and also compulsory inspection, and a declaration of diseased animals. In addition to a fine, severe punishment was meted out to those who broke any of these laws.

I venture to suggest that our present English methods of inspection are almost as primitive as they were on the Continent seven or eight hundred years ago. Therefore, to those of us who know what goes on behind the scenes, nothing but the adoption of most stringent measures and severe punishment upon the violation of any of them will succeed in bringing us suddenly up to date with our Continental and American brethren of to-day.

I have been unable to discover any restrictions as to the sale of milk, except of much more recent date. Those laws which do exist appear to me to be very inadequate, and even at that it is optional to the local authorities whether they adopt them or not.

Sanitary science and hygiene have done much in the past hundred years in reducing the death rate attributable to bad sanitation and overcrowding. But I believe I am right in saying that no marked decline has been noticeable for the past thirty years. In 1898 I notice that in England and Wales alone 60,139 deaths were registered from Tuberculosis of all forms and at all ages, or 1 to every 521 of the population. Nearly 50 per cent. of those deaths were found to be in infants under 1 year old; tabes mesenterica being the form assumed.

Does it not show great laxity in our regulations or their administration when a man can with impunity slaughter, with small fear of detection, a beast dying of some dire disease, such as anthrax, septicæmia, pyæmia, tuberculosis, or quarter-ill, and dispose of the same for consumption by the human race. This, to the knowledge of many country veterinary surgeons, is of frequent occurrence.

Bollinger, in 1876, emphasised the fact that septicæmia and pyæmia of our food animals are more important from a public health standpoint than anthrax or glanders, since the former are much more frequent than the latter, and further, their toxins are not destroyed by cooking. Many outbreaks of meat poisoning have been recorded on the Continent by Bollinger, the following are a few of them:—

1. In 1867, at Fluntern, Switzerland, 27 people became ill from eating the flesh of a calf which was suffering from joint-ill. One patient, who had eaten large quantities of the liver, died, and others recovered slowly, taking 2 to 10 weeks.

2. In 1874, at Bregenz, 51 people were affected, either immediately or in 11 to 48 hours after partaking of the meat or broth made of it from a cow, emergency slaughtered, 5 days after parturition, which retained decomposed placenta.

3. In 1886, at Ludwig-Shafen-Hemshof, 97 persons became ill, all of whom had purchased sausages from the same butcher. An official investigation showed that this butcher had emergency slaughtered a cow during the night, which had been under treatment for three weeks with retained placenta and malodorous discharge from the uterus.

4. In 1891, at Piesenham, a number of persons became ill from eating blood and liver sausages from an emergency slaughtered cow affected with cystitis, enteritis, and gastritis. It was slaughtered under the supervision of a butcher appointed as inspector, who declared the meat edible in spite of the before mentioned conditions.

I much regret that I have to go to the Continent for these statistics, as undoubtedly a number of similar cases have occurred in the British Isles, but have either failed to be recorded or recognised owing to the necessity of veterinary assistance. Two well-known cases, however, have been recorded, viz., the one at Welbeck in July, 1880, when over 72 people became affected after eating beef and ham sandwiches on the occasion of a sale on the Duke of Portland's estate; and the second in February, 1881, at Nottingham, which was similar in nature to the first named. I have failed, however, to discover from what disease the animals were suffering, who provided the meat, as was done in each case I cited as occurring upon the Continent.

Sausages are a medium through which meat, too diseased for any other purpose, may be and is disposed of, detection being almost impossible. You must, therefore, render it impossible for these unprincipled persons to obtain meat other than that duly inspected and stamped for the purpose of sausage-making.

I think I may spare you the tedium of enumerating the diseases at present known to communicate disease to the human race by consuming the flesh or milk of diseased animals. The great question at issue is, how are we to remedy the existing evils?

The U.S. Bureau of Animal Industry set forth in their regulations the principal conditions under which the carcass is to be condemned, and include the following:—Generalised or extensive Tuberculosis, Anthrax, Hog Cholera, Swine Plague, Septicæmia, and Pyemia, advanced Scabies and Actinomycosis, Inflammation of the Lungs, Pleura, Intestines, and Peritoneum, Rabies, advanced pregnancy or recent parturition, any disease or injury causing Pyrexia or otherwise rendering the flesh unwholesome.

Those organs or portions of carcasses which are badly bruised, affected with cancer, actinomycosis, tuberculosis, malignant tumour, suppurating sores, abscess, tapeworm cysts, immature or unborn animals, anæmic or emaciated animals, distemper, glanders, farcy, acute inflammatory lameness, extensive fistula, etc., etc. Hogs affected with certain skin diseases are usually passed after the skin has been removed.

The destruction of the carcasses or parts thereof is carried out under the supervision of an official.

I am strongly in favour of public abattoirs where practicable, and that they should be outside the city, thereby promoting its sanitary conditions and facilitating the reduction of the unedible portions of the offal into an inoffensive article of commerce. I would also suggest that in the case of a tubercular carcase a definite decision be arrived at as to what extent the carcass may be affected and yet be considered fit for human consumption. The Royal Commission on Tuberculosis, in the report which

they made in 1898, referred to the degree of tubercular disease which should cause a carcass or part thereof to be seized. They stated as follows:—

"We are of the opinion that the following principles should be observed in the inspection of tubercular carcasses of cattle: The entire carcass and all the organs may be seized: (*a*) When there is miliary tuberculosis of both lungs. (*b*) When tuberculous lesions are present on the pleura and peritoneum. (*c*) When tuberculous lesions are present in the muscular system or in the lymphatic glands, embedded in or between the muscles. (*d*) When tuberculous lesions exist in any part of an emaciated carcass.

"The carcass of an otherwise healthy animal shall not be condemned, but every part of it containing tuberculous lesions shall be seized. (*a*) When the lesions are confined to the lungs, and the thoracic lymphatic glands. (*b*) When the lesions are confined to the liver. (*c*) When the lesions are confined to the pharyngeal lymphatic glands. (*d*) When the lesions are confined to any combination of the foregoing, but are collectively small in extent."

All organs affected with Tuberculosis must therefore, be excluded from the market as dangerous food material. In this connection, it should be observed that also those organs are to be considered tuberculous in which we find merely an affection of the lymph glands, for although it is known that tubercle bacilli possess the power of penetrating intact epithelia and producing alterations in the neighbouring lymph glands, nevertheless we do not know with certainty, in individual cases, that no tubercles are actually found in the organs. The organs can not be dissected to such an extent that all microscopically-visible tubercles in them may be demonstrated. Moreover, even if this were true, the foci which stand on the borderland of microscopic visibility might escape our attention. For this reason also, as frequently mentioned, all lymphatic glands at the natural openings (alimentary and respiratory tracts) in every food animal should be carefully examined for the presence of tubercles, by palpation and incision.

The requirement is evidently well based that even in the case of the presence of isolated foci in a given organ, the whole organ is always to be considered as dangerous to health. For, quite aside from the fact that the tubercle bacilli quite regularly make their way from isolated foci to neighbouring lymphatic glands and thus pass through the apparently healthy parts of the organ, we have no means of knowing whether or not similar foci have developed at a greater or less distance from the visible tubercles. A tuberculous organ can not, like one which is infested with animal parasites, be rendered innocuous by removing the affected parts.

The Photographs accompanying this article were taken by me from actual specimens, and all are from *Colonial Bred Animals*.

The photo of the rib shewing tubercles or grapes on its inner side, is a remarkably fine specimen, and the cow from which it came was in fine condition.

The Tubercular fowl livers were from Birds offered for sale as food.

The Liver of the dog was from an animal, the constant companion of a consumptive girl, and in this case the fowls in the yard were found to be affected with the disease.

ANALYSIS OF COLONIAL OATS.

By J. Lewis, M.A.

The following Analyses of Colonial Oats were recently performed in the Government Analytical Laboratory.

The Samples were obtained from various Districts of the Cape Colony, through the Civil Commissioners, and represent the general product of the District as offered for sale.

Table No. I gives details regarding the nature of the soil, cultivation and yield of the crop from which the Sample was drawn: Table II gives the weight, and proportions of kernel and husk in the grains of typical samples; the remaining Tables give the Analytical data obtained, together with the average Analyses from other countries.

TABLE I

No.	Nature of Soil.	Fertiliser per acre.	Treatment of Land.	Quantity of Seed.	Kind of Seed.	Yield per acre.	Straw, per acre.	Weight in lbs. per bushel.
			PIQUETBERG.					
1	Clay pebbles ...	None: manured previous year	Not cultivated, 2nd crop ...	1 bag	Colonial, River Plate variety	20 bags ...	3,000 lbs. ...	31½
2	Sandish karroo soil	...	Ploughed and harrowed. 1st crop	1 bag	Algerian	10 bags ...	1–1½ loads ...	30½
3	Broken or mixed	Superphos. about 50 lbs.	1st crop on brak land ...	50 lbs.	Algerian. 2nd years' col.	6½ bags ...	2,000 lbs. ...	36½
4	...	...	...	...	...	...	...	32
5	Sand	None	Land laid fallow in previous year. Year before had barley on brak land with kraal manure	¾ bushel ...	Algerian, 2nd crop. from Imported seed	3½ bags ...	½ load, about 1,500 lbs.	30½
6	Loose soil with pebbles	None	Ploughed and harrowed, 3rd crop	1½ bushels ...	Algerian, 3rd years' seed	10 bags, dry season	1½ loads	37½
			MALMESBURY.					
7	Clay	Thomas Phosphate. 200 lbs.	Land ploughed raw. seed from 1st crop	50 lbs.	Algerian	5 bags ...	1,500 lbs. ...	35½
8	Sandy and little clay	Govt. Guano, 150 lbs. ...	Ploughed and harrowed once, 2nd crop	¾ bag = 115 lbs.	Imported Algerian	22½ bags ...	1 wagon load ...	34

ANALYSIS OF COLONIAL OATS.—TABLE I.—(*continued*).

No	Nature of Soil.	Fertiliser per acre.	Treatment of Land.	Quantity of Seed.	Kind of Seed.	Yield per acre.	Straw per acre.	Weight in lbs., per bushel.
			MALMESBURY —(continued).					
9	Sandy loam ...	Stable manure, 4 wagon loads	Three years fallowed; 1st crop	$\frac{3}{4}$ muid	Product of Australian Oats	$6\frac{3}{4}$ bags ...	$1\frac{3}{4}$ wagon loads...	$34\frac{1}{2}$
10	Mixed clay and sand	None	2nd crop (simply ploughed)	175 lbs.... ..	Algerian	$2\frac{1}{2}$ bags ...	1,500 lbs. ...	36
11	Clay, stoney ground	None this year	2nd crop	1 bushel ...	Algerian	6 bags ...	1,500 lbs. ...	36
12	Sandy	Govt. Guano, 75 lbs. ...	2nd crop	60 lbs.	Algerian, 4th crop, from Imported seed	6 bags (very bad year)	?	34
			CAPE.					
13	...	...	...	...	...	...	...	$33\frac{1}{2}$
14	...	...	...	...	...	..	...	36
			STELLENBOSCH.					
15	Light sandy ...	100 lbs. Basic Slag, 50 lbs. Govt. Guano, 20 lbs. Sulphate of Potash, 50 lbs. Nitrate of Soda	2 ploughings, 5 harrowings	50 lbs.	Algerian	$13\frac{1}{2}$ bags ...	2,725 lbs. ...	$34\frac{1}{2}$
			CALEDON.					
16	Gravelly clay	Superhosphates, supposed to contain 30	Ploughed under stubble: Sequence of crops:— Wheat 2 seasons, Oats 3 seasons, then fallow for 4 or 5 years	225 lbs.... ...			...	$34\frac{1}{2}$
17					(1) Algerian	18 bags	$\frac{2}{3}$ of its weight ...	36
18					(2) Texas	..	...	33
19					(3) River Plate	...	...	40
20							...	33
21							...	$38\frac{1}{2}$
			BREDASDORP.					
22	Sandy	Superphos. 1 bushel ...	...	2 bushels ..	Algerian	$11\frac{1}{4}$ bags ...	375 sheaves ...	$36\frac{1}{2}$

ANALYSIS OF COLONIAL OATS.—TABLE I—(*continued*).

No.	Nature of Soil.	Fertiliser per acre.	Treatment of Land.	Quantity of Seed.	Kind of Seed.	Yield per acre	Straw per acre.	Weight in lbs, per bushel.
			BREDASDORP—(continued).					
23	Clay and sand...	Superphos. ½ bag ...	Ploughed and harrowed, 6th crop	1 bag	Texas	9 bags ...	300 bundles ...	34
24	Clay	Superphos. 50 lbs. ...	Shallow ploughing, 3rd crop	75 lbs.	Algerian	7½ bags ...	250 bundles (bundle =41 lbs)	38
25	Clay and sand...	Guano, ¼ bag	Land treated in first class order, 3rd crop	½ muid	Colonial	10 bags ...	60 grain bags ...	37
26	Clay	Superphos. ¼ bag ...	Ploughed and harrowed, 3rd crop	½ bag	Texas	7½–10 bags	300 bundles ...	36
27	Clay	Supherphos. 75 lbs. ...	Ploughed 3 in. well worked, 3rd crop	100 lbs.... ...	Texas	9 bags ...	300 bundles ...	38½
			ROBERTSON.					
28	Clay	None	Ploughed and harrowed, 1st crop	⅓ bag	Texas	20 bags ...	500 bundles ...	35½
29	Karroo clay ...	None	Ploughed and harrowed, 2 waterings, 3rd crop	50 lbs.	Texas	7½ bags ...	1,450 lbs. ...	36
30	Karroo clay ...	None	Ploughed and harrowed, no water, 1st crop	3 bushels ...	Old Colonial Oats	Not known: average 5 muids from ½ bushel	Not known ...	31
31	Karroo sandy ...	None	Ploughed and harrowed, 1st crop	1 bag	Colonial	16 bags ...	Not known ...	36½
32	Karroo clay ...	None	Ploughed and harrowed, 2 waterings, 1st crop, but sown late	75 lbs.... ...	Algerian	9 bags ...	Not known ...	38½
			ALEXANDRIA.					
33	Sandy	None	Ploughed, sown, and harrowed in usual way	75 lbs.	Egyptian	Sold as Oat-hay	None threshed ...	36½
34	Dark sand ...	Cattle kraal manure ...	Old land cropped once a year	½ bag	Egyptian	...	Does not thresh; sample from oat-hay	30

ANALYSIS OF COLONIAL OATS.—TABLE I—(*continued*).

No.	Nature of Soil.	Fertiliser per acre.	Treatment of Land.	Quantity of Seed.	Kind of Seed.	Yield per acre.	Straw per acre.	Weight in lbs., per bushel.
			ALEXANDRIA—(continued).					
35	Black sand ...	None	Ploughed once a year. 1st crop	37½ lbs.... ...	Egyptian	3 bags ...	...	32½
			KING WILLIAMS TOWN.					
36	Sandy surface...	None	Ploughed and harrowed. 1st crop	¾ sack	Imported	12½ sacks ...	½ large wagon load	36
37	Sand and clay...	None	Ploughed and well harrowed, 2nd crop	¼ bag	Egyptian	5 bags ...	400 bundles ...	32
			CATHCART.					
38	Sandy	None	Ploughed 3 times and harrowed, 3rd crop	⅜ bag	Algerian	4 bags of 130 lbs. each	About 250 bundles	30
39	...	...	...	...	...	...	..	37½
40	Light sandy ...	None, irrigated	Ploughed twice, 1st crop	150 lbs. ...	Egyptian	Not threshed, sold as Oat-hay	Not threshed ...	32
41	Sandy	Kraal manure, 8,000 lbs.	Ploughed and harrowed. 1st crop	150 lbs. ...	Colonial short ...	30 (150 lbs.) bags	2,250 lbs. ...	28½
42	...	...	...	...	...	...	...	43
43	Red soil ...	None	Ploughed and harrowed. 1st crop	½ bag = 75 lbs.	Algerian	Not threshed, sold as Oat-hay	None	35
44	...	...	...	...	...	...	...	33
45	Black, inclined to be sandy	None	Ploughed and harrowed. 2nd crop	1 bag (130 lbs.)	Good seed Oats, particular kind, not known	40 bags ...	40 bales	41
46	Sandy	None	Ploughed and irrigated once, 1st crop	⅜ bag	Algerian	6 bags of 150 lbs.	1,150 lbs. ...	33½
47	Heavy black, inclined to be clayey	Kraal manure, 5 wagon loads	Plouged and harrowed. 1st crop	1 bag	Algerian	40 bags ...	40 bales	33½

ANALYSIS OF COLONIAL OATS.—TABLE I—(*continued*).

No.	Nature of Soil.	Fertiliser per acre.	Treatment of Land.	Quantity of Seed.	Kind of Seed.	Yield per acre.	Straw per acre.	Weight in lbs., per bushel.
			QUEENSTOWN.					
48	...	None	Old lands cultivated for last 20 years	...	...	...	...	27
49	Parts sandy, loose soil: parts vlei, black soil	None	3rd crop	½ bag	Algerian, Col. seed	...	...	34½
50	Sandy	None	Ploughed 3 times before sowing 1st crop	150 lbs. ...	Algerian	52½ bags ...	...	33½
51	Clay	None	2nd crop	150 lbs. ...	...	25 bags ...	1,500 lbs. ...	34
52	Sandy	Farmyard manure ...	Ploughed, 15th crop ...	1 bag	Algerian	17½ bags (not threshed)	1,000 bundles ...	32

TABLE II.

No.	Weight per bushel.	Weight in grammes.			Percentage weight of kernel in grain.
		Weight of 100 grains.	Weight of kernels.	Weight of husks.	
5	30½ lbs.	3·297	2·194	1·103	66·5
6	37½ "	3·393	2·326	1·067	68·5
18	33 "	3·255	2·156	1·099	66·8
19	40 "	3·336	2·220	1·116	66·3
38	30 "	3·427	2·257	1·170	65·8
39	37½ "	2·631	1·777	.854	67·5
30	31 "	2·603	1·546	1·057	59·4
41	28¼ "	2·967	1·613	1·354	54·3
42	43 "	2·490	1·774	·716	71·1

No. 42 was a particularly fine sample, a well-dressed white oat, rich in kernel, and representing a good milling article. It was probably grown from Canadian seed.

TABLE III.

No.	Moisture.	Proteids N x 6·31.	Fat.	Digestible carbohydrates.	Crude fibre.	Crude ash.	In Ash. Phosphoric oxide	In Ash. Lime.	In Oats. Phosphoric oxide.	In Oats. Lime.
					PIQUETBERG.					
1	11·32	9·34	6·18	57·70	11·96	3·50	14·08	2·86	·49	·100
2	10·07	8·24	6·21	61·03	10·80	3·65	16·30	2·95	·59	·108
3	9·84	9·06	6·20	61·15	10·60	3·15	14·02	2·55	·44	·080
4	10·22	10·16	5·83	58·73	11·60	3·46	19·38	3·10	·67	·107
5	10·40	11·26	6·52	59·03	9·74	3·05	22·34	3·01	·68	·092
6	10·37	11·48	5·77	59·07	10·10	3·21	16·55	2·20	·53	·071
					MALMESBURY.					
7	9·37	9·50	6·25	61·05	11·19	2·64	14·82	3·48	·38	·092
8	9·16	9·28	6·41	62·07	9·79	3·29	13·81	2·72	·46	·089
9	10·09	12·31	5·98	59·27	9·43	2·92	11·89	3·50	·35	·102
10	9·70	8·50	5·47	62·70	9·62	4·01	12·03	2·09	·48	·084
11	9·48	9·05	6·45	61·47	10·14	3·41	18·93	2·46	·64	·084
12	9·22	8·73	6·41	63·15	9·34	3·15	17·10	2·94	·54	·093
					CAPE.					
13	10·24	8·71	5·93	61·41	10·61	3·10	14·27	3·74	·44	·116
14	10·03	7·29	6·39	62·72	9·39	4·18	12·03	2·42	·50	·101
					STELLENBOSCH.					
15	10·35	8·06	5·85	62·35	10·05	3·34	14·89	3·52	·50	·118
					CALEDON.					
16	9·55	8·50	6·58	61·54	9·92	3·91	12·37	2·22	·48	·089
17	9·73	8·39	6·21	60·79	10·95	3·93	10·85	2·71	·43	·107

TABLE III.—*continued.*

No.	Moisture.	Proteids N x 6.31.	Fat.	Digestible carbohydrates.	Crude fibre.	Crude ash.	In Ash. Phosphoric oxide.	In Ash. Lime.	In Oats. Phosphoric oxide.	In Oats. Lime.
					CALEDON—continued.					
18	9·30	7·95	6·94	61·59	11·15	3·07	10·23	2·60	·31	·080
19	10·06	8·61	6·96	59·52	11·19	3·66	13·29	2·53	·50	·093
20	10·43	8·50	6·34	59·69	11·33	3·71	12·95	2·60	·48	·096
21	9·62	8·73	6·45	60·86	10·30	4·04	13·88	2·57	·56	·104
					BREDASDORP.					
22	10·18	9·38	6·64	61·75	8·94	3·11	14·03	3·52	·57	·109
23	9·46	9·17	6·84	61·59	9·35	3·59	11·49	3·38	·41	·121
24	11·54	9·05	6·56	60·16	9·26	3·43	11·73	2·84	·40	·097
25	10·48	8·06	6·69	61·56	9·83	3·38	11·67	2·62	·39	·089
26	10·43	8·17	6·68	62·28	9·13	3·31	15·31	2·84	·51	·094
27	10·77	7·17	6·36	61·53	10·08	4·09	12·48	2·42	·51	·099
					ROBERTSON.					
28	9·52	8·17	6·17	61·01	10·69	4·44	15·80	2·64	·70	·117
29	9·77	9·38	6·12	59·92	10·81	4·00	14·73	2·62	·59	·105
30	10·44	9·94	5·66	57·93	12·59	3·44	18·24	3·38	·63	·116
31	9·56	7·83	6·37	60·41	11·61	4·22	17·76	2·54	·75	·107
32	8·98	8·93	6·06	63·32	9·00	3·71	18·36	3·12	·68	·116
					ALEXANDRIA.					
33	9·86	7·94	5·64	60·97	11·89	3·70	12·81	3·12	·47	·115
34	10·46	11·04	6·22	59·05	10·04	3·19	21·31	3·21	·68	·102
35	9·82	10·38	5·50	60·75	9·84	3·71	14·88	2·84	·55	·105

TABLE III.—*continued.*

No.	Moisture.	Proteids N x 6.31.	Fat.	Digestible carbohydrates.	Crude fibre.	Crude ash.	In Ash. Phosphoric oxide.	In Ash. Lime.	In Oats. Phosphoric oxide.	In Oats. Lime.
					KING WILLIAMSTOWN.					
36	8·62	9·50	6·05	62·62	9·67	3·54	10·96	2·20	·39	·078
37	9·34	9·28	6·57	61·76	9·75	2·30	16·98	2·82	·56	·093
					CATHCART.					
38	9·23	10·60	6·13	58·04	12·23	3·77	10·57	3·21	·39	·121
39	9·97	12·26	5·79	59·01	10·09	2·88	17·88	3·39	·52	·098
40	9·75	10·49	4·45	60·81	10·21	4·29	17·77	2·83	·76	·121
41	8·46	9·05	5·39	59·13	13·76	4·21	17·48	3·24	·73	·136
42	10·18	10·16	5·42	62·84	8·46	2·94	24·09	2·37	·71	·071
43	9·39	9·50	4·83	61·65	9·69	4·94	14·24	2·18	·70	·108
44	10·00	12·59	5·73	60·13	8·77	2·78	19·78	3·00	·55	·083
45	9·35	10·16	6·17	61·99	9·02	3·31	15·22	2·76	·50	·091
46	9·40	10·93	6·40	60·31	8·81	4·12	18·19	2·44	·75	·101
47	10·18	9·28	5·27	61·59	9·89	3·79	14·48	2·94	·55	·111
					QUEENSTOWN.					
48	9·83	12·81	4·93	58·71	9·73	3·99	18·31	3·78	·77	·151
49	9·60	9·70	5·73	60·07	10·95	3·95	18·17	2·36	·72	·093
50	9·47	10·58	5·20	61·48	9·14	4·13	16·53	2·74	·68	·113
51	9·47	10·69	5·31	61·71	8·71	4·11	20·26	3·04	·83	·125
52	10·09	11·69	5·19	59·05	9·03	4·65	17·47	2·58	·81	·120

TABLE IV.—AVERAGES.

No. of Samples.	District.	Moisture.	Proteids.	Fat.	Digestible carbohydrates.	Crude fibre.	Phosphoric oxide.	Lime.
6	Piquetberg	10·37	9·92	6·12	59·45	10·80	·57	·093
6	Malmesbury	9·50	9·56	6·16	61·62	9·92	·48	·091
2	Cape	10·13	8·00	6·16	62·06	10·00	·46	·108
1	Stellenbosch	10·35	8·06	5·85	62·35	10·05	·50	·118
6	Caledon	9·78	8·45	6·58	60·66	10·81	·46	·095
6	Bredasdorp	10·48	8·50	6·63	61·48	9·43	·47	·102
5	Robertson	9·66	8·85	6·08	60·52	10·94	·67	·112
3	Alexandria	10·05	9·79	5·79	60·26	10·59	·57	·107
2	King William's Town... ...	8·98	9·39	6·31	62·19	9·71	·48	·086
10	Cathcart	9·59	10·50	5·56	60·55	10·09	·62	·104
5	Queenstown	9·69	11·09	5·33	60·20	9·51	·76	·120
52	Cape Colony	9·85	9·53	6·03	60·77	10·20	·56	·102

TABLE V.—AVERAGES FROM OTHER COUNTRIES.

No.	Name of Country.	No. of Samples.	Moisture.	Proteids.	Fat.	Digestible carbohydrates.	Crude fibre.	Phosphoric oxide.	Lime.	
1	Middle and North Germany	103	12·45	10·82	5·30	58·23	10·25	...	...	Konig.
2	South and West Germany	44	13·39	11·36	5·30	58·12	9·93	...	...	
3	Austria-Hungary	34	11·83	11·41	5·84	56·40	11·01	...	...	
4	France	196	13·50	9·52	5·46	60·47	9·18	...	...	
5	England and Scotland ...	16	13·74	13·05	6·15	53·16	11·89	...	...	
6	America	22	10·67	11·26	4·96	59·35	9·33	...	...	
7	Various	273/560	13·30	10·32	4·77	58·19	10·32	·69	...	Dietrich & Konig.
8	... ...	...	...	...	...	...	...	·68	·100	Wolff.

From the above tables it is evident that as regards organic food material Colonial Oats are equal in value to those of other countries. The percentage of lime is normal, but that of phosphoric oxide is somewhat lower (·56% as compared with ·69%). This deficiency, however, is of less importance as all Oats supply a large excess of phosphoric oxide relatively to lime, and the deficiency of the latter compound must always be made up to the animal from other sources.

DESCRIPTIONS OF SOME COMMON CAPE FUNGI.

By E. P. Phillips, B.A., Assistant in the S.A. Museum Herbarium, and W. T. Saxton, M.A., Lecturer in Botany, S.A. College.

No. I. Some Edible and Poisonous Species: with a note on the effects and treatment of the most common poisonous species by Dr. J. Maberly, M.R.C.S. Eng., L.R.C.P., Lond., etc.

During the last few years a considerable number of cases of mushroom poisoning have been recorded in the Cape and it seems desirable that descriptions of some of the larger and commoner Cape fungi should be published in a popular form so that it may be possible for everyone to identify the various forms described and avoid those of a dangerous nature. The authors have endeavoured to make the descriptions as simple as possible and to avoid as far as is practicable, the use of technical terms. The written account is accompanied in each case by photographs of typical specimens.

Before describing the distinguishing features of the 4 species here dealt with, a short account of the structure and development of one form will be given. The common field Mushroom (*Agaricus campestris*) is better known to most people than any other fungus, and will therefore be taken as a type of the family to which it belongs and described somewhat more fully.

It consists of a stalk bearing at its apex an umbrella-shaped body which has a series of radiating gills on its under surface. The umbrella-shaped gill bearing part is called the *pileus* or *cap*. If a mushroom is carefully pulled out of the ground, some fine filaments may be seen attached to the base of the stalk. Each of these filaments is called a *hypha* and collectively they are termed the *mycelium*. What is known as mushroom spawn consists of a composition in which a quantity of this mycelium is growing. The underground mycelium performs the duties carried out in flowering plants, e.g. an orange tree, by the roots branches and leaves, the mushroom itself corresponding to the fruit (i.e. the orange of an orange tree).

If the cap of a mushroom is cut off and laid gills downwards on a sheet of white paper for a couple of hours it will be found that a dark purple coloured print of the gills has been left on the paper. On examining this with a strong lens it is found to be formed by a large number of minute bodies called *spores* which (to carry on our analogy a stage further) represent the pips of the orange. The spores are carried great distances by the wind and thus the plant is widely distributed. Should a spore fall on a place suitable for its germination it puts out a small tube (a hypha) which grows and branches repeatedly in the soil, forming the mycelium. As the mycelium developes, small swellings appear here and there. These elongate and broaden at the apex and soon form small "button" mushrooms. The young cap is connected with the stalk by a delicate membrane called the *veil* which completely encloses the gills. As the mushroom grows this veil is stretched and finally ruptured and only remains as a membranous *ring* on the upper part of the stalk.

The above description of the development of the mushroom is one which will apply almost word for word to several hundreds of other fungi, the majority of those generally known as toadstools. There are, however, certain features by which the common edible mushroom may be with certainty distinguished from other gill-bearing fungi. A character which is readily seen is the *colour of the gills.* These when fairly young are a bright flesh colour gradually changing to a dark brown with a tinge of purple as the mushroom grows older and eventually becoming almost black. True mushrooms *never* have white gills except when quite in the "button" stage when it is safer to leave them alone unless clearly growing from the same clump as older specimens.

A second point to notice is the presence of a membranous ring or collar rather more than half way up the stem, but the entire absence of any membrane, sheath or scales at the *base* of the stalk.

Thirdly, the gills are not joined to the stalk, but end rather abruptly just before reaching it, thus leaving a smooth ring next to the stalk on the lower surface of the cap.

Lastly remember that the common mushroom usually grows on open ground and *never* on trees or fallen stumps. The normal appearance of the common mushroom, known to Botanists as *Agaricus campestris* is so well known that no photo need be given, to aid in its recognition.

Most of the cases of mushroom poisoning are traceable to two kinds of toadstools, one of which is (apparently) mistaken for the common mushroom, and the other probably eaten because of its attractive appearance.

Fig. I.—3 specimens of *Amanita Phalloides* showing the general appearance of this fungus (also known as *Amanita Bulbosa*). About two-fifths natural size.

The first of these is the most poisonous toadstool known and is appropiately called the death cup, its technical name being *Amanita phalloides.* (Figs. I. and II.) Externally it somewhat resembles the common mushroom in having a drab-coloured cap and in the presence of a membranous ring or collar rather more than half way up the stalk. It can, however, be readily distinguished by the following points:—

1. The gills always remain *white.*

2. The stalk is swollen considerably, quite at the base (usually below the ground), and the swollen part is generally surrounded by a sheath, above which are a few white scales. (Well shown in Fig. II.)

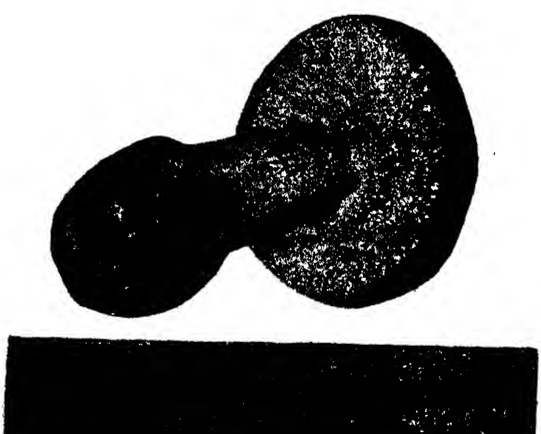


Fig. II.—A specimen of *Amanita Phalloides* showing the bulbous base very clearly. (Inch and centimetre scale below.) Orangezicht.

3. The gills are joined to the stalk.

This species grows commonly in woods, especially in oak woods, and seldom in open ground (large numbers can often be found in the Oak woods just above Orangezicht). The cap is generally shiny and slightly sticky above and occasionally has a number of small white scales attached to it. The colour varies from a light drab to a dark brown with a greenish tinge.

The second species is such a conspicuous object that it can hardly be mistaken for any other fungus. The colour of the upper surface of the cap varies from bright yellow (or almost white occasionally) through all shades of orange to a deep red and it is sprinkled with a number of small white warts, well shown in the photograph (fig. III.). It grows to a larger size than either of the other two species described and is therefore very easily recognised.

It is variously known as the Fly Mushroom, Fly Agaric, or Fly Amanita and technically as *Amanita muscaria*, being closely related to the last species (*Amanita phalloides*). It agrees with the death cup in the

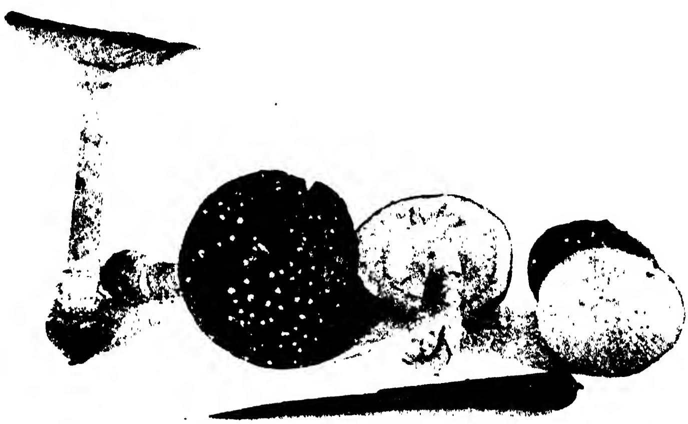


Fig. III.—Specimens of *Amanita Muscaria* from Tokai woods (kindly brought by Mr. N. L. King of the Forest Department). One-fourth natural size.

gills always remaining white and in the swollen base of the stem, and possesses a conspicuous white ring or collar like the other two fungi described.

No universal rules can be given for distinguishing poisonous from edible fungi, but the following will, if followed, prevent any fatalities.

1. Never eat a fungus unless you have satisfactorily ascertained its name and its non-poisonous character.

2. Especially avoid all fungi which have permanently *white* gills or a swollen base to the stalk, or both.

3. Avoid mushrooms in the "button" stage unless you are certain that they are part of the same clump as other edible ones.

One other gill-bearing fungus will now be described which is not only edible but has the additional merit that the only other fungi for which it might be mistaken are also edible or at any rate harmless so far as is known. This fungus is the one sometimes known as the "Shaggy mane mushroom" (*Coprinus comatus*). The chief distinguishing feature of the various species of Coprinus is that the gills turn a pure black when mature and then deliquesce to form a black inky fluid. Our species is further distinguished by (1) the shape of the cap—more or less that of a closed

umbrella. This is shown in the left hand specimen (young) of the photo (fig. IV.), which has been cut in half longitudinally; (2) the presence of ring, not, however, so conspicuous as in the other species described, shown in the middle specimen (also young) in the figure; (3) a number of shaggy scales on the outer surface of the cap. This is shown in the right hand specimen (mature) in the same figure. A piece of the cap has been broken off this one to show the black colour of the gills; (4) its large size. The knife shown in this and in Fig. III. is 8 inches long (handle and blade), and serves as a guide to the actual size of the specimens photographed.

In conclusion we hope that these descriptions, which we believe to be perfectly intelligible to those having no previous knowledge of the subject, will arouse some interest in this group of plants, about the South African representatives of which comparatively little is yet known.

(The following account of the effects of *Amanita phalloides*, the first species described, and the treatment of cases of poisoning has been kindly furnished by Dr. Maberly. The specimens shown in fig. I. were part of a batch actually concerned in one of his cases of poisoning.)

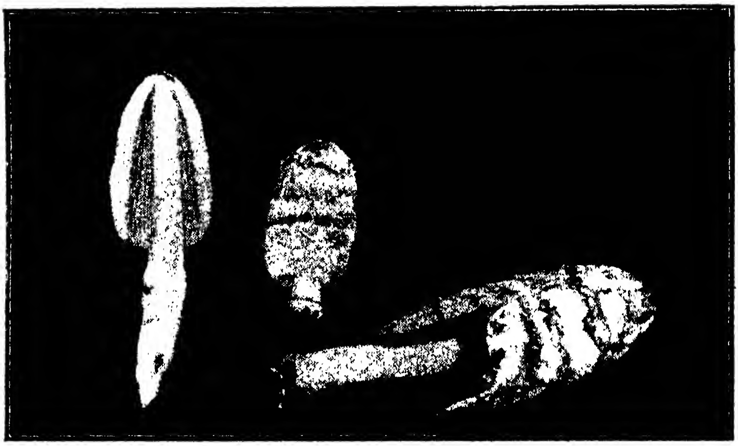


Fig. IV.—3 specimens of *Coprinus Comatus* from the quadrangle of the South African College. The left hand specimen cut in half lengthwise. One-third natural size.

TREATMENT FOR MUSHROOM POISONING.

"A FEW PRACTICAL HINTS ON THE ACTION OF *Amanita phalloides* ON THE HUMAN SYSTEM AND METHODS AVAILABLE TO LAY MEN IN COMBATING THE DANGEROUS EFFECTS OF THIS FUNGUS," by Dr. Maberly, M.R.C.S., L.R.C.P., etc.

The ill effects of eating *Amanita phalloides* do not appear at once but after an interval of from half an hour to three or four hours afterwards. The length of this interval depends on the activity of the digestive process and the time required for the absorption of the poisonous principle into the system.

In cases which have come under my notice in South Africa the first symptoms of poisoning are giddiness and languor. These are followed by inability to stand or walk steadily, and later by muscular twitchings or convulsions. The condition is in many ways similar to that of a person suffering from an overdose of alcohol. If untreated the patient rapidly becomes drowsy, lies down and passes into a semi-conscious condition in which he is apparently aware of what is going on around him and may

answer questions in a more or less coherent manner, but on recovery will have no recollection of what has happened. The heart and consequently the pulse-beats, become quick and feeble, and in bad cases death will occur from heart failure within a few hours. The fatal result may, however, be delayed for two or more days, or recovery may take place in some cases even without treatment.

The final result of a case depends largely on the amount of the fungus which has been eaten and also on the age and condition of the patient. As many cases occur in the rural districts of South Africa often miles away from skilled medical assistance, it is advisable that the lay public should know what measures to adopt in cases of emergency, as those most likely to be of real service to the patient. These measures may be divided into two heads:—

1. The removal of the cause.
2. The combating of the effects of the poison on the heart.

Their efforts should first of all be concentrated on an attempt to remove any portion of the fungus still left in the stomach and intestines. This, if allowed to remain, would continue to be absorbed and so intensify the ill effects of that portion of the poison already digested.

The most effectual means of emptying the stomach are by administering emetics, such as a tablespoonful of mustard in a tumblerful of warm water, or two tablespoonfuls of common salt in a tumbler of tepid water, or one or two teaspoonfuls of Ipecacuanha wine. If these means do not succeed copious draughts of warm water should be given, or the back of the throat may be irritated with the finger or a feather. In using the latter, care must be taken to hold it firmly so that it is not swallowed by the patient.

As to attempting to remove any portion of the fungus that may have passed into the intestines, the best way is to give an enema of warm soapy water, as much as can be pumped in by an ordinary syringe, up to two or three pints if possible. A dose of Castor Oil or Epsoms salts should also be given. In these ways as much as possible of the undigested or partially digested fungus will be removed from the system.

Secondly, the condition of the patient must be attended to. The chief and all important organ is the heart. If no medical aid is available a tablespoonful of brandy or some other stimulant should be given every half hour for 3 or 4 doses, and some hot coffee or tea, with the object of keeping up the circulation as much as possible. The patient must not, however, be disturbed by attempts to rouse him unnecessarily. A mustard plaster may be applied over the heart also with the object of stimulating that organ. Medically such drugs as strychnine, digitalis and adnephin are used for the same purpose. These, however, are more or less of a poisonous nature and should never be employed by those not properly qualified in the knowledge necessary to administer them safely.

CATTLE IN THE STUTTERHEIM DISTRICT.

NOTES ON THE POSSIBILITIES OF FARMING WITH CATTLE IN THE STUTTERHEIM AND NEIGHBOURING DISTRICTS OF CAPE COLONY.

Written for the Stutterheim Farmers' Association by Dr. ERIC A. NOBBS, and read at their Meeting on the 18th July, 1908.

It has within recent times become axiomatic in Cape Colony that the system of farming followed must now pass from the extensive to the intensive method. That is to say, that increase in the size of the holdings is becoming less often possible, and that it behoves the progressive farmer to make the utmost use of the land he has, increasing in every way the productive capacity per acre. The prospects appear to favour the chances of frequent sub-division of farms—not in all cases an undesirable or disadvantageous change. With this sub-division there is associated the inevitable necessity, unless the farmers are to become poorer, of changing our ways and taking to mixed farming in place of the very one-sided methods now in vogue. Smaller holdings imply better use of the land, "high farming" so called, and the closer settlement, which, if it does not lead to great individual wealth, yet certainly increases the national prosperity and gives more homes, more intercourse, and more opportunity for progress and culture. The change may be slow, but I think it will be admitted that all the signs point this way.

Another economic idea which is gaining ground is the principle that the risks of farming are lessened by increasing the variety of the activities pursued. This plan of placing one's eggs in a number of separate baskets is particularly sound in a country which long experience has shown to be specially liable to sudden outbreaks of disease, to unexpected falls in values, to injury by drought, locusts, or flood, and which must in the natural course of events be exposed to a constantly increasing competition—within its own borders and from without. Apply these principles to the Stutterheim district and the vicinity. The area is one of the most notable in Cape Colony, as essentially a sheep district, in a relatively highly developed condition. As districts go, fencing is very well advanced, and sub-division of farms into camps is already usual. Owing to its remarkable suitability for sheep, the district has gained a pre-eminent position in this respect, to the virtual exclusion of other things. It must at once be admitted that sheep farming brings in at present a much higher return per acre than any other form of farming—except, perhaps, that with the black biped stock now gaining in popularity in some parts. Any other form of farming must therefore be regarded as less profitable, and must possess other compensations before it can be advocated. Mixed farming

gives increased security and better distribution of work, both for master and man. Moreover, in some measure the presence of one class of stock helps the veld to carry more of another, and, if properly controlled, mixed stock can be very profitably worked to assist one another in keeping the pasturage right. Further, it is a most rare occurrence that any farm is suited only to one class of live-stock. Few districts anywhere are so one-sided as the region to which these notes refer, and even here the benefits of mixed stocking are admitted. These statements are in even a greater degree applicable to the adjoining districts of Komgha and East London, which were formerly regarded as consisting of excellent sheep veld till heartwater ruined them. Since the systematic dipping of large stock made it possible to stock the land more heavily, first cattle became more numerous, and now sheep, even merinoes, are being introduced successfully. The cattle bite the taller grass and allow the finer ones to grow between. It is these latter also which are most apt to be destroyed by veld fires. The seed, too, where the veld is not annually burned, but eaten down, has more chance to mature and to germinate. Not to be omitted is the effect of the conversion of some seventy or more pounds of grass per beast daily into manure in the place of the loss of all this in the smoke of occasional fires. In the aggregate this is not insignificant.

Different classes of stock have preferences for particular grasses, hence mixing cattle, sheep, horses, and goats prevent any one species left uneaten from spreading unduly over the veld ; mixed stocking—to be carefully distinguished from over-stocking—thus leads to a refinement, enrichment, and improvement or "sweetening" of the veld.

It will, therefore, be agreed that with more fencing and more large stock the need of veld-burning, an admittedly necessary evil at present, might to a considerable extent be reduced and brought into reasonable control. This is a practical impossibility with only sheep on the farm, in effect no one really farms with only one class of stock.

What stock then may most profitably be added, subsidiary to the main industry of sheep farming? Goats and ostriches are at once to be rejected, as relatively unsuitable, and horses in a degree less so. Other districts are so much more favourable for these classes that they are, except on quite a minor scale, to be rejected by the process of exclusion. There remains only cattle, for which the district is well suited, in addition to sheep, by nature. At present the food supply of cattle is largely removed by systematic veld burning, but cattle ever will be second, and but a poor second, to sheep.

Of cattle farming there are many forms, some are unsuited to the circumstances of the district. Milk production on a large scale implies peculiar advantages for transit to market, for labour, and for a plentiful and assured supply of green food, natural or artificial, all the year round. That this is not possible in Stutterheim all will admit, except perhaps in a few exceptional cases. Cheese-making requires a reliable and relatively large supply of milk for a season, at least sufficient to remunerate a competent cheese-maker and to occupy him profitably. Wherever many cows are needed labour at milking time is necessary. Rearing calves entails the use of home paddocks and the like, which in a sheep district may be more wanted for lambing ewes and stud sheep.

Under these circumstances and in view of the present conditions, some other line seems desirable, and this might be found in the elsewhere profitable occupation of fattening cattle for the butcher. In Europe and elsewhere this process has been reduced to a fine art—and a very profitable one. In many parts of England and Scotland the grazier buys what are called store cattle, corresponding to our tollies, fattens them on pasture or on grass, supplemented by linseed cake, and other artificial foods, and after six or seven months sells them at fat stock auction sales to the

E 2

butcher. The same practice is to some little extent followed in South Africa, where the grazier farmer is for some obscure reason termed a "speculator," which he is not, but just as much a producer and *bona fide* farmer as the sheep, wine, or corn producer. The graziers' stock are bred in the neighbourhood sometimes, but are largely brought to the richer pastures of the Midlands, of Durham and Northumberland, and largely to the south and east of Scotland from poorer parts where the cattle breeding is followed, or from dairying districts where the pasture is wanted for milk cows, not for oxen. Great numbers of live-stock are thus sent annually from Wales and Ireland, and at one time came from Canada. In this way the finest meat in the world is produced, great massive carcasses over 2,000 lbs. in weight, with a minimum of bone and offal, with a great development of the most valuable parts, the loins, porterhouse, etc., with white fat embedded in succulent, well-flavoured flesh—the antithesis of the stringy old trek ox. In South Africa much has yet to be learnt of how to grow, quickly and cheaply, tender, well-flavoured beef, with a fine grain —meat of the very best quality. Can this want not be satisfied with advantage here? It seems so. The markets of the Cape may as time goes on be expected to become more particular and fastidious than is to-day the case. The buyer will show greater discrimination in the selection of the slaughter stock, and only the best ripe meat will be in demand. This should prove the opportunity of the South-eastern Border farmer, who will take the trouble, and who will prepare himself for the change. At present, it must be admitted, there is little incentive to produce meat of a superior quality, but public taste has to be educated up to such things, and until it is known that a better article exists and may be had for a somewhat higher price, the consumer will take what he can get and not want more. The profitableness of fattening cattle for the butcher must, of course, depend on the relative prices of lean and fat stock and the time required for and the cost of fattening. This in turn depends largely on the pasture and on the breed and quality of the cattle in question, the selection of animals inclined to lay on flesh readily, and, of course, like everything else, on the accidents of markets, demand, and supply. These considerations point to the conclusion that there is a reasonable opening, a need, and an opportunity for rearing and purchasing cattle for the purpose of fatting off for the market, and that this procedure should enhance the profits of farming and increase the use made of the land, at the same time benefiting, but remaining subsidiary to, the main occupation of the district—sheep farming. Fortunately for the proposal, several of the best-known periodic stock fairs in South Africa are held within the immediate vicinity. There should, therefore, never be much trouble either about the purchase of lean stock or the disposal of fat stock. In buying lean stock to fatten a very different animal must be chosen to what is wanted for trek purposes. In place of long limbs, firm muscles, and sinews, powerful shoulders and back, and well-developed scoff, the animal to fatten readily must be short-legged, with a deep body, and well-sprung ribs, and broad frame, on which much meat and fat may be laid on, the skin must be soft and elastic, and the temperament mild and calm. The native stock and the Afrikanders are, as a rule, of the former type, slow growing and hard, whereas the profitable grazier's beast will be one showing at least some signs of Shorthorn, Hereford, Angus, Devon, Welsh, Sussex, and the like. In Cape Colony there should be no difficulty in maintaining sufficient hardiness in cross-breds containing more or less of the blood of these artificial breeds. In comparison with stock fed for milk production, fattening cattle on natural pastures produces flesh and fat at a minimum expense and with very little attention; at the same time, fattening oxen does more to keep down and improve the veld than do cows, which are apt to be less active in seeking food, though equally in need of

it for milk formation, being, as a rule, partially stall fed. Where, as in this case, cattle are of secondary, not prime, importance, the advantages of adopting the system of purchasing lean stock, and feeding it, is especially to be recommended, as it does away with all the labour and trouble associated with breeding, and the capital is returned sooner, no sum being sunk in the breeding cattle needed. In favour of this plan it is also to be remembered that the absence of a fixed number of breeding stock materially helps when the occasional droughts come round. Stall feeding is out of the question, of course, and all that is needed additional to the usual appurtenances of a farm to-day is adequate shelter in the camps, roofed sheds, or plantations of trees. The possibilities of disease must be faced, but this risk has now been materially reduced by the spread of systematic and general dipping, the rapid extension of which practice is already making its mark on the horned stock industry.

To find their food on land for many years grazed by sheep, the cattle required for the purpose in view must be of a special character, small, with a good, compact frame, on which flesh can be readily piled up; active, yet with a readiness to fatten; hardy, yet of an early maturing nature; quick, that is, to take advantage of favourable conditions, yet able to withstand adverse spells. Sires of the heavy breeds, such as the beefy type of Shorthorns, Frieslands, and the like, are disqualified, in spite of their fattening properties; the Afrikander, with many virtues, is, on the other hand, though hardy, too slow maturing to be the most ideally profitable beast, especially if bred as well as fattened on the farm.

In the more purely sheep-veld cattle are of less importance than where the grass grows rankly and with a tendency to be sour. Besides *shelter* for the stock, a reserve of food is very desirable, and wherever possible hay should be cut on the veld and made into stacks, which, when they have sweated, form an invaluable stand-by for the winter. On every farm there are opportunities for growing some extra food, be it lucerne, rape, turnip, paspalum, Rhodes grass, or the like. As time goes on these must all come into daily use, and the sooner the better. What is best for each individual case can only be ascertained by the slow, but sure method of experiment, by trying things on a small scale first. That the veld of Stutterheim is naturally good is known to all; it follows that the soil and climate must be exceptionally suitable to grasses, and that the pasture could therefore be readily improved by artificial means by sowing better grasses and by paddocking. As deserving of at least very careful trial, it would be well worth while to try to establish paspalum, Rhodes grass (on the old lands), fescues, cocksfoot, Yorkshire fog, rye grasses, and rescue grass. First experiment, and if they answer, then sow mixtures of the best. Simultaneously with the improvement of the pasturage, the stock carrying capacity of the farm can be increased by fencing appropriately and by judicious and systematic dipping. It has been proved to demonstration that any farm adequately fenced and sufficiently heavily stocked can be cleared of ticks by regular and consistent dipping, together with the careful exclusion of infected cattle. Every farm should have a quarantine paddock, and all purchased stock should be kept there for a month, during which time they may be dipped three times, first on arrival, again 14 days later, and finally before being allowed to mix with the rest of the animals on the farm. The writer was on a recent occasion much struck with the high degree in which the desiderated qualities just mentioned are present in the Welsh breed of cattle as found on the farm of Mr. Pell Edmonds at Dohne, Stutterheim, and in cross-breds by a Welsh bull out of the ordinary cattle of the country. These animals were remarkable for their uniformity and resemblance to the pure-bred Welsh, showing the prepotency of a sire of an old fixed breed over nondescript cows. The

Welsh cattle are essentially meat producers, though ranked also as good milkers. They have a faculty, more than most, of laying on flesh when grazing, as opposed to stall fattening, which some other breeds, such as Frieslands, and in a measure Shorthorns, are more disposed to do. In England, Welsh oxen, so-called "runts," are much in request for grazing purposes and *for fattening on the grass.* And especially this breed is renowned for hardiness and activity, for being able to live roughly, yet keep condition and to respond to any improvement in their surroundings.

Writing of the Welsh breed 70 years ago, since when they have improved, Youatt, the classic authority on such subjects, said:—"They combine to a considerable degree, and perhaps as far as they can be combined, the two opposite qualities of being very fair milkers, with a propensity to fatten. The meat is generally beautifully marbled. It is equal to that of the Scotch cattle, and some epicures prefer it. They thrive in every situation, they will live where others starve, and they will rapidly outstrip most others when they have plenty of good pasture." If a personal opinion may be submitted, it is that this breed has a special purpose to serve in South Africa, in that it has certain resemblances to our original breeds, and harmonising in conformation, is more suited for the purpose of improving and grading up common and native cattle than are the more artificial breeds, such as Jersey or even Shorthorns and Frieslands, whose qualities have been very highly developed in certain particular directions. These may with success be used later on, or where these extremely specialised qualities are required, and their corresponding needs supplied.

Another suggestion may be ventured. We have amongst us a breed of cattle—the *Pondo*—with very desirable merits, and such distinctive properties that it would be well both to infuse some of this blood into our common herds, and to endeavour, before it becomes lost, as it is quite likely soon to do now, to preserve it pure, and by careful breeding and selection, so as to establish it and further develop its peculiar points. These animals are too well known to those for whom these lines are written to need description. It may, however, be pointed out that these animals possess in a remarkable degree for a "native" breed that subtle point termed "quality," which conveys, *inter alia*, the fact that they fulfil in a high degree our expectations of them: the milk is rich, if not plentiful; there is a very large proportion of meat on the carcass; they make the most of their circumstances; lay flesh on fast and keep their condition; the skin is soft in texture and thin, and hair smooth and silky; the bones small, and the limbs buck-like, hard, and finely chiselled. The horn is refined, not coarse; the neck creases are fine and numerous; the tail is thin and tapering. The frame of the Pondo is singularly "blocky," deep, rectangular, and smooth, one part merging into another. The animal is symmetrical and compact. It is of small size, not a serious drawback—indeed, frequently an advantage on inferior pasture, where the more legs and mouths to a given live-weight the more chance of sufficient food being found and eaten. With all respect to the greater experience of those familiar with the breed, I submit that it has traits and possibilities deserving of attention, and likely to prove of material benefit to our farmers if judiciously applied.

These notes have been put on paper at the request of the President of the Stutterheim Farmers' Association, an honour for which I thank him. They are to be regarded as those of an outsider, but if they merely serve to promote discussion on the subject handled, even of a destructive critical character, they will not be in vain.

THE GREAT DIP CONTROVERSY.

DOES LIME AND SULPHUR INJURE WOOLS MORE THAN OTHER DIPS?

INTERESTING EXPERIMENTS.

REPORT BY MR. S. B. HOLLINGS.

The much debated question "Does Lime and Sulphur injure wool more than other dips?" having reached the acute stage, an effort has been made by the Agricultural Department to secure by actual experiment some positive results which might help to settle the controversy. Unfortunately, some delays arose, and the reports are published much later than was anticipated. The scheme of the experiment was to select certain sheep, have them shorn, dip sections in different dips at various stages of the growth of the wool, leaving one section undipped as controls, shear at the end of twelve months, and send the fleeces for treatment up to the dyeing stage in order to test the effects of the different dips.

The first portion of the experiment was carried out under the supervision of the Chief Inspector of Sheep, who reported to the Director of Agriculture, on May 27, 1907, as under:—

I have the honour to report that 31 sheep were purchased from Mr. Hockly, of Cullendale, Bedford. These sheep were shorn on the 23rd and 24th April, 1906, and marked in the ear with the following numbers: 1 and 71 to 100 (inclusive). On the 25th April, 1906, three of these sheep were dipped in Cooper's Powder, three in Tobacco extract, and three in Lime and Sulphur. Three months later nine other sheep were treated in the same manner; and at six months from the date of shearing nine more were dipped as above described. In each case a second dipping was given, as nearly as possible within 16 days of the first operation. On the 7th instant I had the 31 sheep shorn and the wool (minus the locks and pieces) packed in separate bales. Unfortunately, five animals, which included two marked 72 and 87, dipped with short wool in tobacco extract, one sheep (77) dipped with short wool in lime and sulphur, and another (90) dipped with three months' growth of wool in the same mixture, and one of the control animals, undipped, had lost their numbers, and I was unable to identify with what dip they had been treated. The wool from these latter sheep was therefore packed in bale marked XI. The wool from the three control sheep which were not dipped was packed under separate cover, numbered X. The fleeces from the other sheep were packed in bales, as per attached list:—

Bale I.—Sheep Nos. 74, 83, and 92. Dipped in *Cooper's Powder*, April 25 and May 12, 1906.

Bale II.—Sheep Nos. 72*, 75, and 87*. Dipped in *Tobacco Extract* (Austrian Brand), April 25 and May 12, 1906.

---

* These are the sheep that lost their numbers.

Bale III.—Sheep Nos. 77*, 82, and 91. Dipped in *Lime and Sulphur*, April 25 and May 12, 1906.

Bale IV.—Sheep Nos. 95, 98, and 100. Dipped in *Cooper's Powder*, August 14 and 29, 1906.

Bale V.—Sheep Nos. 71, 85, and 96. Dipped in *Tobacco Extract* (Austrian Brand), August 14 and 29, 1906.

Bale VI.—Sheep Nos. 73, 86, and 90*. Dipped in *Lime and Sulphur*, August 14 and 29, 1906.

Bale VII.—Sheep Nos. 88, 89, and 93. Dipped in *Cooper's Powder*, October 26 and November 17, 1906.

Bale VIII.—Sheep Nos. 76, 79, and 94. Dipped in *Tobacco Extract* (Austrian Brand), October 26 and November 17, 1906.

Bale IX.—Sheep Nos. 80, 84, and 97. Dipped in *Lime and Sulphur*, October 26 and November 17, 1906.

Bale X.—Three fleeces from undipped sheep

Bale XI.—The fleeces from the sheep that lost their numbers.

The above samples, merely numbered as above and with no information as to how each had been treated, were forwarded (after some delay) to Mr. S. B. Hollings, the well-known authority on wool, with the request that he should get each lot scoured separately and treated up to and including the dyeing stage, and report on each sample fully. In the instructions it was stated that the object of the experiment was to procure precise information as to the actual effect of lime and sulphur on the manufacturing quality of wool and the precise effect of that compound on the wool in the dyeing stage.

Mr. S. B. Hollings very kindly acceded to the request of this Department, and carried out the rest of the experiment with great care and precision, as his report attached hereto indicates. To make the report perfectly clear, each section is prefaced with the details of the dipping, which were unknown to Mr. Hollings. Sheep farmers can accordingly draw their own conclusions.

MR. S. B. HOLLINGS'S REPORT.

The following is the full report forwarded by Mr. S. B. Hollings:—

The Agent-General for the Cape of Good Hope in London on March 24th last sent me eleven samples of Cape wool, with a request that I "ascertain to what extent, if any, the wool had been affected by certain dippings at different stages of growth." The information more particularly desired was: "(*a*) What is the actual effect of lime and sulphur on the manufacturing quality of the wool; and (*b*) what is the precise effect of that compound in the dyeing stages?" I have now pleasure to report upon same, having carefully examined each sample in the greasy state, and also when scoured and dyed. Let me say that from first to last these Cape wools have been handled in an ordinary commercial way, and have in no sense been doctored or dealt with in a superficial manner.

The man who has done the scouring and dyeing is a very practical hand, having been connected with the scouring and dyeing of wool all his life, and is the head operator at one of our best Yorkshire mills. In addition he received a technical training in the dyeing department at the late Yorkshire College (now the University of Leeds), hence the man knows his job thoroughly.

* These are the sheep that lost their numbers.

Sample No. 1.

[This sample was from sheep dipped in *Cooper's Powder* immediately after shearing. See Report C.I.S. above. Dipped twice in proportion of one packet powder to 25 gallons water. Sheep immersed one minute in dip.—Ed. *Agricultural Journal.*]

This sample contained three fleeces, which weighed 24 lbs. The wool was well grown, nice length, 70's quality, but rather tender. I noticed especially that towards the tip of the staple it was very weak, and snapped in two quite easily, the ends, as it were, being rotten. When scoured it came a poor, yellow colour, being in parts very stained and discoloured. The dyer says: "I scoured this sample, and found it to wash quite naturally, but the colour is anything but good, and such ought not to appear in any scoured combing wool. I had no trouble in cleansing and removing the grease and other ingredients, while in dyeing I had no difficulty in getting a level and even shade." The colour of this dyed sample is pink, but to me it lacks that rich, bloomy shade which it should have had. In my own mind I doubt if this pink shade would reveal the presence of any injury which the fibres have sustained in dipping, but the dyer had a free hand, and selected this pink shade for this particular sample, which has come out even and level.

Sample No. 2.

[This sample was from sheep dipped in *Tobacco Extract* (Austrian brand) immediately after shearing. See Report C.I.S. above. Sheep dipped twice; one gallon of dip to 150 gallons of water. Sheep immersed one minute.—Ed. *Agricultural Journal.*]

Here we had one fleece, weighing 10 lbs. Quality 64's, mostly sound, though tender in parts. It was yellow, as if sulphur had been deposited in fairly large quantities upon the fleece, and it was not so well grown as Sample No. 1. Some staples snapped very readily, and was not so attractive in appearance as it might have been. When scoured the wool was not by any means the best of colour, showing patches of yellow stain. This is what the dyer says: "I scoured this sample of wool, and found it somewhat difficult to treat. It did not scour naturally, as wool should do. It seemed as if something was in the wool which had a reaction upon the scouring liquor, and destroyed the scour. The reaction on the scour I should say could have been produced by lime and sulphur. In dyeing, I got a somewhat uneven shade." The colour of this sample is a dark brown, and no manufacturer would pass it for being level and true. It shows both light and dark places, some being quite olive in colour, and others a very heavy and dead brown.

Sample No. 3.

[This sample was from sheep dipped in *Lime and Sulphur* immediately after shearing. See Report of C.I.S. above. Dipped twice; 25 lbs sulphur and 18 lbs. of lime to 100 gallons water. Sheep immersed one minute.—Ed. *Agricultural Journal.*]

This weighed 14 lbs., there being two fleeces. One was very yellow in appearance, but of good length and very fine quality, the other fleece being shorter, and indicating a more stunted growth. The staple ends were very dry and harsh, and as I tested the sample for strength, I could see some powdery substance fly out. About one inch from the tip of the staple it quite easily broke in two. This sample was anything but attractive, the yellow appearance being objectionable. Any practical wool man could see at once that it would not come a good colour.

The dyer says that he had "no difficulty in scouring the wool, but the colour is very bad." I confirm this, and it has come about the worst white of any of the eleven samples, being very similar to No. 1. It is dingy, very yellow, and is only fit for dyeing black, or some such dark shade. The man dyed this sample olive brown, and it is very uneven and very unsatisfactory. There is a complete lack of uniformity of shade throughout.

Sample No. 4.

[This sample was from sheep dipped in *Cooper's Powder* three months after shearing. See Report C.I.S. above. Twice dipped: $1\frac{1}{4}$ packets powder to 50 gallons water. Sheep immersed one minute.—Ed. *Agricultural Journal.*]

This sample weighed 28 lbs., and contained three fleeces. Two of them were lighter than the other, one especially being very well grown. They showed good super 64's quality, good length, but very tender in parts, and damaged I should say by dipping. One of the fleeces had a very yellow bottom. I was surprised how the staple broke in two, no effort whatever being required. The dyer says: "I scoured this sample, and found it very difficult to treat. It behaved like Sample No. 2. In dyeing I got a very uneven shade." The colour is a blue, and anybody can see at once how uneven it is. It is light and dark in places, and no manufacturer would pass it.

Sample No. 5.

[This sample was from sheep dipped in *Tobacco Extract* (Au trian brand) three months after shearing. See Report C.I.S. above. Dipped twice: one gallon dip to 150 gallons water. Sheep immersed one minute.—Ed. *Agricultural Journal.*]

Here we had three fleeces, weighing 26 lbs. Two were better grown than the other, not so yellow in appearance, 70's quality, sound, and more like what wool should be. It was a little harsh in handle, and one fleece was a little tender. This also was yellowish, particularly near the bottom of the staple. The dyer says that the scouring was "same as Sample No. 1," that is, he had little difficulty in treating it, and the shade is fairly true and even. The scoured sample is anything but satisfactory to my mind, being very yellow in parts and discoloured. At the same time, I am bound to admit that the puce shade is passable, and a good commercial colour.

Sample No. 6.

[This sample was from sheep dipped in *Lime and Sulphur* three months after shearing. See Report C.I.S. above. Dipped twice; 25 lbs. sulphur and 18 lbs. lime to 100 gallons of water. Sheep immersed one minute.—Ed. *Agricultural Journal.*]

This sample weighed 19 lbs., and contained two fleeces. One fleece was finer than the other, being 70's, and the other 60's to 64's quality. It was the latter that was the soundest. Generally speaking, the colour of this wool was more like what wool should be. It was nice and soft, generally sound, though in parts the staple snapped about an inch from the tip. The dyer says: "I scoured this sample, and found it to wash quite naturally. I had no difficulty in removing the fatty matter and other ingredients from the wool. In dyeing, I got a somewhat uneven shade." The colour of this sample would have been first-class, but here again it is touched with yellow stains, and no amount of scouring would remove them in any sample. The dyed shade is a blue, and here again it lacks uniformity, being light and dark in places. I call it very unsatisfactory, and would not be passed by any manufacturer.

Sample No. 7.

[This sample was from sheep dipped in *Cooper's Powder* six months after shearing. See Report C.I.S. above. Dipped twice; 1¼ packets to 50 gallons of water. Sheep immersed for one minute.—Ed. *Agricultural Journal.*]

This parcel contained three fleeces, weighing 27 lbs. One was specially good, and the best fleece I had opened up so far. One showed a decided break in the staple, and the other was rather fatty and heavy, but fairly sound. These fleeces so far showed the best colour, and presented the most healthy appearance, and more like what wool should be. I am all the more surprised with this in view of what the dyer reports concerning this parcel. He says: "I scoured this sample, and found it very difficult to cleanse the wool from its fatty substance and other ingredients. The reaction on the scouring liquor was very severe, almost destroying the scour altogether. I had to make a fresh scouring bath before the wool was anything like passable. It handled somewhat sharp, harsh, and brittle, and has not that soft, kind handle that wool ought to have when it scours naturally and in the ordinary way. In dyeing, the shade is only fairly even, and not by any means perfect." A thought occurs: Has the dipping had a greater percentage of lime in it than sulphur? I am all the more surprised with the dyer's report when I view the wool in the greasy state, but the dyed sample confirms what I have always said, that lime and sulphur dip comes up quite unexpectedly, and reveals itself when dyed. This sample is not even in shade, as it should be.

Sample No. 8.

[This sample was from sheep dipped in *Tobacco Extract* (Austrian brand) six months after shearing. See Report C.I.S. above. Twice dipped: one gallon dip to 150 gallons of water. Sheep immersed one minute.—Ed. *Agricultural Journal.*]

Here we had three good fleeces, one particularly so, but two were tender in parts, mostly across the back. The colour was good, generally sound, well grown, and a very desirable class of wool. I liked this sample the best I had seen so far, and the colour on the whole is as good a white as any. It was 64's to 70's quality. At the bottom of one fleece the staple was fastened together, and it gave me the impression that they were lime crystals, as if the sheep had been dipped quite recently. The dyer says that "in scouring and dyeing same as No. 6." The shade dyed is a light blue, but is not level, true, or even.

Sample No. 9.

[This sample was from sheep dipped in *Lime and Sulphur* six months after shearing. See Report C.I.S. above. Dipped twice; 25 lbs. sulphur and 18 lbs. of lime to 100 gallons water. Sheep immersed for one minute.—Ed. *Agricultural Journal.*]

Here we had three fleeces again, weighing 28 lbs. One was rather short, fatty, and tender in parts; another was very light and attractive, sound, and well grown; while the third was heavy and fatty, tender here and there, but would pass well for soundness. It was good commercial wool, and above the average for Cape. It showed a good average colour, and handled well. The dyer says: "I scoured this sample, and found it exactly like No. 7. In dyeing, the wool is somewhat uneven in shade." The colour when scoured is only average, and not as good as I had expected to see. It is a little yellow in parts, but the shade (a light blue) is a rotten one. It is about the worst imaginable. I must candidly say that from the character of the greasy wool I expected a different result. But these blues are the very shades to reveal anything wrong in wool.

Sample No. 10.

[These are the fleeces from the undipped sheep. See Report C.I.S. above.—Ed. *Agricultural Journal.*]

This parcel contained three fleeces, weighing 25 lbs. One was well grown, good length, rather weak in staple across the back, but a good average colour. Another was rather tender, somewhat yellow, but a useful class of wool, though in parts it handled a little harshly. The remaining fleece was the soundest in the lot, quality 70's, well grown, a little yellow, but a very desirable fleece. The dyer says "Same as No. 1," indicating that he had no difficulty in scouring. This is what I expected, but the yellow stains show distinctly on the scoured sample. The shade dyed is a puce, and is a good, passable commercial colour. Some parts are a little darker than others, but there is nothing like the unevenness which some samples show.

Sample No. 11.

[These were the fleeces from the sheep that lost their identifying numbers. See Report C.I.S. above.—Ed. *Agricultural Journal.*]

This was the biggest parcel in the lot, containing five fleeces. One was rather fatty, soft in handle, sound, good length, 70's quality, and average colour. Another was 64's, tender in parts, particularly in the neck and back, fair length, average colour, and lighter than the previous fleeces. No. 3 was a very good fleece, capital length, 64's to 70's quality, average colour and condition, but some staple tips were very tender, as if it had been in contact with some dip. Another was very similar to the previous description, but, if anything, more sound. The last fleece was very good, sound, average handle, and a good colour. Here and there the fleeces showed a little yellowness in the bottom, while some of the staple tips were very tender, but on the whole they were five useful fleeces of wool. The dyer says: "I scoured this sample, and found it just like No. 7. In dyeing the wool, the result was an uneven shade." The colour of the scoured sample was hardly as good as I thought it would be, and the light blue shade of the dyed sample is anything but satisfactory.

What surprises me most in the above is that where the best results could have been expected, the actual outcome is otherwise. I noticed distinctly that samples No. 8 to 11 contained the best grown wool, and they presented in the greasy state a more natural and healthy appearance than the previous samples, and yet the shades when dyed are anything but satisfactory. It will be most interesting to know what the wools have been dipped in. Finally, let me say that I am more convinced than ever that lime and sulphur sheep dips are injurious to the wool fibre, and the results seen above confirm all the objectionable features I have hitherto experienced when conducting experiments with these dipped wools. All the above samples have been dealt with in a fair, honest, straight, and business-like way, and the results are anything but what they should be.

(Sgd.) S. B. Hollings.

P.S.—I would just say that for each sample a fresh scouring bath was made and treated by itself, and likewise in dyeing every sample was handled separately and independent of each other.

CAPE FRUIT IN RHODESIA.

CONDEMNED CONSIGNMENTS.

The following is a list of consignments of Cape Fruit condemned by the Rhodesian Administration during the season 1907–8, under the Importation of Plants Regulation Ordinance, 1904 :—

Date.		Imported from	By whom Imported.	Description of fruit.	Disease or Pest.
Dec.	17	Paarl, C.C.	Wightman, Bulawayo	9 boxes pears destroyed	Codlin moth and apple maggot.
Jan.	20	Stellenbosch, C.C.	Rabinowitz, Bulawayo	72 cases fruit consigned, apples destroyed	Codlin moth.
,,	28	East London	Lang. Bulawayo	4 cases fruit destroyed. Aband ned by co signee, G.N. No. 211, no certificate	—
,,	30	Stellenbosch, C.C.	Rabinowitz, Bulawayo	46 cases fruit consigned, 200 pears destroyed	Codlin moth.
,,	30	De Doorns, C.C.	Naidoo, Bulawayo	7 boxes apples consigned, 34 apples destroyed	do.
,,	31	Hex River, C.C.	Market Master, Bulawayo	12 cases pears consigned, 1 case destroyed	do.
,,	31	Huguenot. C.C.	Rabinowitz, Bulawayo	18 boxes apples consigned, 150 apples destroyed	do.
,,	31	Stellenbosch, C.C.	Rabinowitz, Bulawayo	74 cases fruit consigned, 100 pears destroyed	do.
,,	31	De Doorns, C.C.	Naidoo, Bulawayo	9 boxes apples and 2 boxes pears destroyed	do.
Feb.	4	Huguenot, C.C.	Rabinowitz, Bulawayo	12 boxes apples, 20 cases fruit consigned, 390 apples and 120 pears destroyed	do.
,,	8	Stellenbosch, C.C.	,, ,,	42 cases fruit consigned, 45 apples destroyed	do.
,,	13	Stellenbosch, C.C.	,, ,,	27 boxes fruit consigned, 5 apples destroyed	do.
,,	18	Huguenot, C.C.	,, ,,	4 boxes apples consigned, 170 apples destroyed	do.
,,	20	Stellenbosch, C.C.	,, ,,	78 cases fruit consigned, 70 pears destroyed	do.
May	6	C.C.	P. J. Maltas, Umtali	2 cases apples destroyed. No certificate forthcoming at Umtali	—
Feb.	25	Kimberley	Ramson ...	2 cases pears destroyed	Codlin moth.

CAPE FRUIT IN RHODESIA.—CONDEMNED CONSIGNMENTS—(*continued*).

Date.		Imported from	By whom Imported.	Description of fruit.	Disease or Pest.
Feb.	27	Cape Town	Simon ...	30 cases consigned, 30 apples and 12 pears destroyed	Codlin moth.
April	1	Beaufort West (Noble)	Blackbeard, Bulawayo	2 cases quinces destroyed	do.
"	16	Grahamstown, C.C.	Ryland, Bulawayo	23 cases consigned. 6 cases grapes destroyed Under Government Notice No. 211 of 1907	—
"	21	Stellenbosch (Nicholson)	Rabinowitz. Bulawayo	14 cases fruit consigned, 1 case apples destroyed	Codlin moth.
"	21	Cape Town (Wood & Co.)	Simon, Bulawayo	5 cases pears destroyed	do.
"	23	Hex River (Steenkamp)	Rabinowitz, Bulawayo	16 boxes consigned, 4 apples destroyed	do.
March	5	De Doorns, C.C. (De Vos)	Naidoo. Bulawayo	3 boxes consigned. 7 quinces d stroyed	do.
"	5	Hex River (Steenkamp)	Rabinowitz, Bulawayo	31 boxes consigned, 1 box and 18 apples destroyed	do.
"	5	Malmesbury (E. A Kara)	Kara, Bulawayo	8 boxes apples and pears consigned, 34 apples and 4 pears destroyed	do.
"	10	Paarl (D. Marais)	Wightman, Bulawayo	100 boxes consigned, all destroyed	do.
"	10	Stellenbosch (Rabinowitz)	Rabinowitz, Bulawayo	20 cases grapes destroyed	Mildew.
"	17	Stellenbosch (A C. Butler)	" "	43 boxes consigned, 14 apples destroyed.	Codlin moth.
"	17	Stellenbosch (A .C. Butler)	" "	66 boxes consigned, 18 apples destroyed	do.
"	19	Hex River (Steenkamp)	" "	20 boxes quinces consigned, all destroyed	do.
"	19	Stellenbosch (Rustenberg)	" "	8 boxes pears consigned, 5 pears destroyed	do.
"	28	Cape Town (Wellington Fruit Co.)	Cold Storage, Bulawayo	50 cases apples consigned, all destroyed	do.
"	31	Stellenbosch (Nicholson)	Rabinowitz. Bulawayo	41 boxes fruit consigned, 6 apples destroyed	do.

CORRESPONDENCE.

The Classification of Merinos at Shows.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—May I be allowed space for the following remarks on the circular which has just been issued to all Agricultural Societies by the Agricultural Union on the Classification of Merino Sheep at Agricultural Shows, viz.: "Your Committee wish to report that they are strongly of the opinion that the present classification of merino sheep at Agricultural Shows is detrimental to the best interests of the sheep industry, more especially in that it tends to the crossing of the various distinct types of sheep, producing animals of no fixed type at all, but merely a show sheep."

I think that an alteration in the classification of merino sheep at shows is desirable for two reasons—(1) because of the large number of medium woolled sheep which can compete either in the fine or robust classes; (2) because a class of sheep competes (more especially at Rosebank and Port Elizabeth) which is bred for carcase as well as wool and which suits the country where it is reared, but stands no chance with the more densely clad and smaller merino from the point of view of the wool-grower.

For these reasons, after judging this year at Rosebank, I wrote to the Secretary recommending that sheep should be classified as follows:

Class A. Merino sheep bred principally for wool.
Class B. Merino sheep bred for wool and carcase.

The Committee of the Agricultural Union, whose report is now under consideration, recommend that the classification be arranged for future exhibitions under three classes, viz.:

1. Australian and Tasmanian type.
2. Rambouillet type.
3. Vermont type.

and their reason is that the crossing of the various distinct types of sheep produces animals of no fixed type, but merely a show sheep.

Now, at the Stud Breeders' Conference, held at Cradock in July, 1904, it was resolved that as all merino sheep originated from Spain, sheep bred from different strains should be eligible for entry in the Stud Book provided their imported ancestors were pedigree stock. Unless the Australian and Tasmanian type is explained as a sheep bred principally for wool, who is to decide what the type is since Australian types vary from plain to wrinkly, and from sheep producing a short clothing wool to others producing a five-inch staple.

(2) Rambouillets, as sheep bred for mutton and wool, should be separately classified; but it may be noted that many sheep called Franco-Americans, bred between the Rambouillet and Vermont, are now being imported. How should they be entered?

(3) In regard to Vermonts, I do not think there are many, if any, pure Vermont studs in South Africa. They have been used here, as in Australia, for certain definite purposes, and they have benefited flocks when used with discretion and done harm when used otherwise.

In regard to the latter part of the Committee's report that the crossing of the various distinct types produces merely a show sheep, the steady annual improvement in the sheep shown as South African bred is apparent to all interested. The best sheep should win at a show, but if the Committee's report be adopted the best sheep might be liable to disqualification unless the judges can class him as belonging to one of the types recommended.

The adoption of the Committee's recommendation will lead either to (1) only breeders who have bred from one strain being entitled to exhibit, and with curtailment of entries comes curtailment of interest; or (2) if all may still exhibit, to breeders picking out their sheep as in their opinion they conform to the three types.

Finally, if breeding from one strain leads to fixity of type, why do breeders continue to import?—Yours, etc.,

R. PELL EDMONDS.

Ripplemead, Dohne, 1st August, 1908.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In the August issue of the *Journal* I read the report of the Special Committee appointed by the Agricultural Union of the Cape at their eleventh annual congress, on the question of the classification of sheep for shows, which same was adopted by Congress. No doubt the idea of the resolution is well meant, but in spite of that, my humble opinion is that if the resolution, as it now stands, is generally adopted by Agricultural Societies throughout the country, it cannot fail to put a damper on enterprise in the formation of new and perhaps more adaptable South African types.

Besides disagreeing with the principle of the resolution, it seems ridiculous to recognise only one type for all Australasian sheep, because the sheep of Australasia comprise several distinct types of the merino, and from each of these types sheep are drawn for the improvement of flocks in South Africa. If these types are to be taken collectively as an Australasian type, then we may as well regard all English cattle as of one type, and in that case we would have Shorthorns, Devons, Polls and Ayrshires all competing in the same class. But that is absolute nonsense, and just so much would it be nonsense to have all Australian sheep competing in the same class, if any change is made at all.

It is a very reasonable suggestion that the different types of merino sheep should not have to compete against each other at shows, but not for the reason conveyed in the Union's resolution. I take it that certain types are adapted to certain localities, for instance, the Vermont merino type does not, as a rule, thrive as well as some of the others on the sparsely-covered Karroo veldt, being necessarily a very wrinkled and heavy-woolled sheep. They are not suited to roam over large areas in search of feed and water, they are more profitable on rich pasture land; whereas some other types not so very wrinkled and lighter woolled, prove more profitable on such sparse pasture land. Hence it would seem very unfair and unbeneficial to the end of Agricultural Shows to make these types compete against each other, because each of these types is best in its own way and locality, and, consequently, when animals of different types are exhibited in the same class, the placing of the awards must depend entirely on the particular experiences of the judges and the favourite type or types in their several localities.

I cannot quite understand Congress's reason for wanting to prevent the intermingling, in breeding, of the different types of merino. Surely they cannot consider any of the present types perfect already, and want to prevent the formation of new types. The merino of the present day has reached a very high standard of perfection, but that is no reason why aspiring South Africans may not hope to achieve a higher standard of perfection with sheep through the medium of their own (African) types influenced by the conditions and circumstances attending. It is in this way only that the sheep of the present day have been bred to such a high standard and adaptability to various localities in other countries. Take the Australasian sheep as an instance of this. It is well known that Australia's first woolled sheep were obtained from the Cape Colony, about the end of the eighteenth century. These sheep at that time must have been pure Spanish merino, or a cross between the Spanish sheep and the native Cape sheep. Subsequent to their introduction into Australia they were bred to imported Rambouillet and Saxon sheep, and latterly to the Vermont from America, and to-day we find famous merino flocks in Australasia, such as those of "Wangannella," "Widgiewa" and "Bellevue." According to "Australian Merino Studs," by "Brune," the Wangannella type was derived from a direct cross of Vermont sires with the progeny of imported Rambouillet sheep.

Of course I do not wish to advocate crossing different fixed types indiscriminately and aimlessly, but so soon as the cross produces a desirable sheep and nearest to what you are aiming for the type of that animal, or animals, must be fixed by discarding, right through, all those which do not in the least resemble your ideal. Keeping the present types pure is the best and only thing to do if you are convinced that nothing better can be produced, but such is not perhaps the stockman's fullest meaning of the term "breeding." It is merely "upkeeping" a breed or a type which has already been fixed by someone else. Where a fixed type can be raised in great numbers, on country suited to its requirements, it proves advantageous, inasmuch as the wool will be, or should be, of the same quality and staple right

through, and when a big clip of wool of the same quality can be supplied it generally commands a readier sale.

All these things should be a guide to those seeking to achieve success in the sheep and wool industry, and it seems a very rational thing to believe that in the future Africa may yet produce her own types of domesticated live stock, types second to none.

I trust that the readers of this will at least credit me with having taken an unbiased view of the case. The best thing to do now, I should say, would be for the breeders of South Africa to ask the "Agricultural Union of the Cape" to reconsider their resolution, *re* the classification of merino sheep for the show, with a view to so amending it that it shall be most beneficial to the industry and providing for the recognition of a South African type.—Yours, etc.,

C. C. VERMAAK.

Leeuwfontein, 20th August, 1908.

Breeding Instincts in Sheep versus Drought.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I note among our farmers' flocks, as well as in my own, a circumstance that, while it may be purely accidental, is worthy of consideration and perhaps experiment. It is the custom of sheep farmers here to place their rams to the flock in September, withdrawing them about March. This year the lambing season about here is remarkable for the scant number of early lambs, although sheep of all classes were in good condition in September, and the veld good with local rains up to December. Since December no rain has fallen here, and drought has caused loss of lambs and sheep to some extent; in fact, we are going through an ordinary drought. My own flock have, since 1905, been left entirely to nature, the rams remaining with the ewes all the year round. The number of lambs dropped between December and April 30th number only seven, and I do not expect any more for some months. A stall-fed Swiss goat ram, active throughout the summer of 1906, has declined service altogether from September, 1907, to March 20th, 1908, although his flock were in good condition like himself. This goat only became of service on March 20th, eight days before a fairly general rain fell south-west of our district. Animal instincts with regard to changes of weather are well known; the question that arises now is, are they conscious of approaching drought and consciously or instinctively abstain from breeding? From my flock I got in 1907 a fair crop of early lambs, though the spring of 1906 was dry. This autumn I got practically none, and we are in the middle of a drought. Experiment can only be made by those who have enclosures running, say, 50 ewes all the year round with the rams, and 50 served at fixed periods. About five years' trial should decide whether it is better to leave our sheep to nature in this respect or to breed them up to date. I am considered very lucky by my fellow farmers in having no lambs to destroy.—Yours, etc.,

HERBERT ALSTON.

Van Wyk's Vlei, May 7, 1908.

June 30th, 1908.

I have deferred the foregoing letter until further confirmation of the scant lambing season was obtained, and it so happens that another remarkable incident has taken place which may be of interest as it possibly indicates the contrary instinct and the break-up of the drought now six months old. The Swiss goat ram was put to the flock for the purpose of serving the young goats and such as had remained over from the March service; the result was that the goats served in March instantly took the ram, and by the third day fifteen had cast their lambs. So far I have not met anyone here who has experienced this before, and it is looked upon as a sign of rain, the more so as the fault was distinctly that of the ewes who, by the way, are in very poor condition and, therefore, not liable to a perverse instinct in the direction of breeding. Should the drought break up shortly, I shall let you know; meanwhile other breeders of stock may have some reasonable explanation to offer on the subject.

H.A.

July 13th, 1908.

General rains have just fallen, the rainfall from 1¾ to 3 inches in the district, and to all appearance the storm has been one of great extent; it is, moreover, the first great rain in July since 1878 for the inland districts the last record I have showing a fall of six inches of snow in addition to the heavy rain in that year and month.

So far the instinct of the animals would seem to be correct with regard to rainfall or the reverse; the important point to note is that when rains are approaching breeding instinct apparently exceeds that of self preservation, resulting in loss to the farmer unless the possibility is remembered and due precautions taken. As an indication of approaching seasons it remains to be proved.

HERBERT ALSTON.

P.S.—I purposely postponed this letter to await the rainfall, as the incidents alluded to are quite outside the experience of our local farmers.

How to Administer Poison to Jackals.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I beg, through the medium of the *Agricultural Journal*, to make certain suggestions which I hope will become useful to farmers. Many farmers seem to find great difficulty in administering poison to jackals. A great deal of this trouble may be overcome if the farmers were more unanimous in preparing poison baits for jackals in a more careful way. In administering poison to jackals care must be exercised alike in quantity and preparation. Many farmers inject either an overdose or prepare the bait in such a way that the cunning jackal will think a dozen times before taking it. A very simple and convenient way of preparing is suggested in the following: Take a piece of glazed butter paper about two inches square, twist up the one end as is done in the case of sweet packets. This is facilitated if a slate pencil with a sharp point or a similar implement were utilised. Then insert with a tooth pick about two grains of pure powdered strychnine (Jacob Hulle's recommended) into centre of paper. This completed, twist up the open end so that the poison is now safely embedded into the centre of the paper. Now dip this packet of poison into melted kidney, or suet fat, or such fat as will, after cooling, become hard. It is advisable to arrange a good many doses in this way at the same time; since it involves much less labour than is the case if special fat had to be heated for each dose. The scheme of surrounding the paper with fat is, as will be seen, essential. The paper becomes damp-resisting, so that the poison will not easily pass through the paper in case of the juice in the meat affecting the paper. A very important factor, since on that account the meat cannot become bitter by the effect of poison, and as is the case when the poison is inserted unguarded into meat. Now take the packet of poison, insert it into the centre of a piece of fat meat about two inches square and an inch thick; dip the pill into some lard or dripping. This will have the tendency to remove any smell which may frighten the jackal, and will have a more tempting attraction. Fat meat is recommended in preference to lean since the former is more alluring. Great caution must, however, be taken before inserting the poison. It is a fatal error to insert it unguarded, for since strychnine is a very bitter substance and penetrates the meat readily the jackal will shy clear of the bait after tasting of the bitter substance and will drop it at once a few yards away from the spot where it was placed, and will never be persuaded to take the second poison pill. So it is very essential to be careful in the first instance.

Now let us consider which are the most suitable spots where to lay the pills and how to attract the fox. The most suitable places seem to be in paths which jackals habitually frequent. In laying the bait a very good plan is to obtain the carcase of an animal and drag it along the paths mentioned, and drop the pills about three hundred yards apart on the path where the carcase has been dragged. After doing this the carcase may be placed on some tree out of the reach of the jackal, and a number of pills deposited under the tree. As the carcase decomposes the jackals will be attracted from miles away. Sometimes, in fact generally, the jackal is not found. This seems only natural. The poison acts so slowly that the jackal will run for miles before ultimately succumbing to the pill. One thing is certain, the jackal will invariably die. The farmers may argue that this is a distinct disadvantage; the jackal not being found, their trouble has ended in nothing. There would have been some reason for such an argument when rewards were paid out for death proofs. Our main object is to get rid of the cunning fox, and the pill will have this effect. I am quite sure that this method of preparing pills for jackals is fatal to them, and strongly recommend it to farmers.—Yours, etc.,

T. J. WATSON.

Cookhouse, August 3.

The Stewart Sheep-shearer.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I have read with interest the troubles of Mr. Webster with the Stewart Sheep-shearing machine. I, too, have had a melancholy experience with the same, as last October when in England, I bought six machines of the No. 6 type, which I hoped to be able to induce our tenants to use had they proved satisfactory. We tried one, and one only, as even with the aid of the much-belauded grinder, we found them totally unfit for the work required.

Now, in the July number of your magazine, I see a long letter from the Agents (Messrs. Alexander) taking up the cudgels on behalf of the manufacturers. There are six machines of the No. 6 type here, five in their original cases, which Messrs. Alexander can purchase at £2 each, far below their cost price in England, and also below what Messrs. Alexander can obtain them from the manufacturers; or I will forfeit £10 to any charity if any two men, selected by Messrs. Alexander, using the No. 6 machine, can sheer 900 full-grown merinos in six days of eight working hours, if Messrs. Alexander will forfeit the like sum in the event of their failure.

I mention 900 as they say in their letter to you, " an intelligent native with practice could sheer up to 150 sheep a day." And, of course, the same machine must be used the whole time.—Yours, etc.,

W. GRAHAM McIVOR,
Managing Director, Read's Drift Land Co.

Douglas, Cape Colony, July 31.

Supposed Lung Worm in Sheep.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Can you, or one of your readers, come to my assistance as regards the following request? In my goats there is a kind of lung-sickness, and I have tried already anything I could think of, but nothing avails. The symptoms are: The goat starts coughing, just like a "jaagziek" sheep, and also worse. It seems as if the nose is internally stuffed; in some cases the throat swells, and the animal soon loses condition until it has become quite weak, and the result is death. I have had several opened. They are all the same internally. The lungs are affected; it seems as if the whole lung has become rotten through inflammation. Some of my sheep are similarly affected, only the nose is covered in front with bloody snot.—Yours, etc.

J. H. VAN DER WALT.

Welvanpus, June 6, 1908.

[The cause is probably a parasite of the lungs or lungworm. The Chief Veterinary Surgeon would be pleased to communicate with the writer of above if he will forward his full postal address.]

Kaalziekte in Young Stock.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I shall be very much obliged if one of the readers of the *Agricultural Journal* could advise me on a kind of disease called "Kaalziekte." I have a splendid Karroo farm for goats, sheep, etc., but all the little lambs that are born on said farm get the Kaalziekte and die. I have tried several remedies, but everything has failed to cure the little, hairless animals. Hoping to get some advice.—Yours, etc.,

BOK BOER.

Willowmore.

From the North-West.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—We, stockfarmers of the district of Kenhardt, after having passed through a time of depression from 1907 till July, 1908, see the beginning of our deliverance from the severe and intense drought in the favourable rain which fell over the whole of the district from the 9th to the 11th of July. As far as is known to me, we got fairly well off as regards our poor stock, which had to be in such a continuous rain. The veld is growing very slowly, but we can't expect better, July being a month in which neither veld nor stock of any class goes on well as a rule. We hope,however, soon to have better conditions and our stock in health, as we feel very much our losses of the past, not only on account of drought, but actually through severe diseases, as, for instance (1) vomeerziekte, (2) lamziekte, (3) klauwziekte (footrot), (4) haarworm (wireworm). These are all diseases, the appearance of which in our district amongst sheep as well as goats was markedly fatal; and the result was that a large proportion of our stock was much injured as to condition. It could be noticed at once when disease was amongst the herds; they were very poor and low-spirited. This was the primary cause, together with the drought, of our heavy losses. I wish to thank Messrs. Hayward and Co., Port Elizabeth, for the remedy against footrot sent me on trial, viz., footrot ointment. I have tried it on twelve to fifteen sheep, and may say that it had a good effect. But the most beneficial remedy was ash thrown about at the drinking troughs, and sprinkled with water so as to make a mixture like mud. That has removed the disease at once. Against wireworm I received a remedy for trial from Mr. M. U. Gradwell, Woodlands. I experimented on six sheep, which showed outwards signs of wireworm. I gave them one dose. One died and five recovered immediately. I can't say exactly that the sheep were infected with wireworm, but they were ailing; the remedy, administered according to recipe, had a good effect.

I have also suffered great loss in my ostriches. In December, 1907, I had eighty plucking birds and forty chickens, all of them grazing in a camp of about 4,000 morgen. When the drought increased, I had to feed them with bones (?) and later on the poor ones with mealies; but all in vain. All that is left over is five. I will not say that it is all due to the drought; there being so many diseases amongst sheep, there were probably also amongst the ostriches.

Should people from elsewhere imagine that the farmers of the North-West are too narrow-minded or too lazy to carry on any agricultural industry, they must not forget that there are farmers here of enterprising spirit. But there are good reasons to be named, and which speak for themselves, to render the farmer or man of progress or of good principle dejected and to break down his spirit. Firstly, we live in a part of the world which, as to its pasturage, is of a poor character, very scarce in grass and bushes. Secondly, an arid and warm climate, and very little favoured with general rains. Thirdly, one finds the natural waters at a depth of 50 to 80 feet; besides, there are very few suitable spots for good dams, for the purpose of catching a large quantity of water; and the expenses for getting water for a stock farm by means of pumps are very heavy. From this it may be inferred what it would cost to start a grain, hay and lucerne-growing industry here.—Yours, etc.,

T. G. DE KLERK.

Hartebeestvlakte, District Kenhardt, P.O. Upington.

The Cape Horse.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I notice in your journal a contribution on the Cape horse, in which it is stated that the only really useful horse for South Africa is the Thoroughbred. Being not only a lover of Thoroughbreds, but also a breeder, I consider that I have at least some authority in stating that this statement will not only prove misleading, but also detrimental to horse-breeding in general in South Africa.

To begin with, I wish to state that, if we were obliged to use one strain of horse only I would decidedly choose the Thoroughbred; but as such is not the case, I cannot agree with "Griqua" in using the Thoroughbred only. Experience has proved that there is no other breed that is as difficult to strike the right sire as the Thoroughbred. From the very best blood I have seen such complete failures that they are totally unfit for anything. How many three-year olds have not been sold for less than their covering-fee? I have seen a colt by "Flying Fox," a three-year-old, out of a very

valuable mare, that has never performed, so weak in the limbs that he could barely trot. Therefore, if we look into the past, how many Thoroughbred sires did we have in South Africa which have really proved a success? The writer mentioned "Pearl Diver," who was decidedly a grand old horse, and so is his stock; but how many have we struck that were nearly as good? He also mentions that the course is the only place to prove the best horse, to which I agree to a certain extent; but I am sure that your readers will agree with me, through having been bred for the course only. The Thoroughbred is no longer the pretty animal of about twenty years back; because, if a horse has made a show on the course, he is used for the stud, leaving his looks out of consideration altogether. Your correspondent is strong in condemning all the other breeds. As my experience is not ripe with any other breed but the Hackney, I am not afraid to state that our Government saved the general breed of the South African horse by introducing the Hackney.

What has brought our strain of horse so far back? Was it not through breeding from the Thoroughbred only. Did we not find that our horses were becoming so weedy that they were neither fit for the course nor the plough? I have seen the first cross with the Hackney on the Thoroughbred mare as fit for the saddle as the plough, and have seen the first crosses make a show even on the course in very good company. I have also driven the cross-bred Hackney all distances and under all circumstances. Not only myself, but all those who have used the least discretion in crossing will agree with me that the cross-bred Hackney is not only the most saleable but also the most useful stamp of horse we have yet bred. I only argue that the pure Hackney is decidedly too heavy to be an all-round useful horse; but must also state that the general run of Thoroughbred is too light to be useful, and also not hardy enough on the veld. So what prevents us to cross them, and thereby build up a strain to meet the requirements of the public in general?—Yours, etc.,

EXPERIENCE.

To the Editor, AGRICULTURAL JOURNAL.

Sir,—I quite agree with "Griqua" in his remarks in your July number, except that I do not consider that the reputation of the Cape horse has been ruined. On the contrary, he is recognized as a most serviceable animal, but his reputation is in danger for the reasons stated. We should breed from English Thoroughbreds or Arabs. I was very anxious to obtain a really good pair of Hackneys, and paid one of our well-known breeders in the Colony a long price for a pair of pedigree colts, but I regret to say they proved altogether too heavy for riding purposes, and indeed even for ordinary draught work. I had to sell them to a commercial traveller to draw an enormous cart for which they were better suited.—Yours, etc.,

SOUTH AFRICAN.

Walfish Bay, Aug. 9.

Government Veterinary Surgeon Appreciated.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Recently there was sickness amongst my cows, about which I felt rather uneasy. After having called in the help of some of our most able farmers, who have also a fair knowledge of cattle diseases, and who all of them agreed that it was "gall-sickness,' and, after having administered the common boer remedies from which the animals, however, did not derive any benefit, I made use of the services of Mr Payne, veterinary surgeon at Elsenburg. After examination he said, to the surprise of all, that the cattle had not a natural disease, but that some mischief had been done to them or that they had got this in some way or other. Die they all shall, he said, and in the heart of each of them we would find a piece of wire. At the time people laughed at that, but what did happen? The first cow died, and a piece of wire was found in the heart; it was the same with the second one, and the third one also.

Fortunately, all suspicion was cleared away, for on examining my fodder I found that some of the same wire with which the bags of loose goods (oathay) had been tied up had been ground together with the forage in the forage machine.

By communicating this I do not only wish to testify from my own experience to the ability of Mr. Payne and to express my appreciation of it, but the above may also serve as a warning to our stock farmers to be discreet in condemning competent veterinary surgeons.—Yours, etc.,

D. J. SCHNEIDER.

Paarl, 10th August, 1908.

The Efficacy of the Divining Rod.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Having read many letters in your instructive and useful *Journal* on the divining rod for the pointing out of water, I decided to acquaint you with my own experience. I can assure you that water will be found where the rod is properly used. I have made two experiments with it, and in the one case water has been found on the farm, which is sufficient for agricultural purposes as well as for as many head of stock as can drink there daily. The water was found at a depth of 30 feet in a well of 9 feet diameter, and it attains the height of 12, the supply being inexhaustible. On the other farm water has also been found, but it has not yet been opened fully, and therefore I am at present unable to give you an account of it. I trust there are now sufficient proofs to show that it is useless to doubt the efficacy of the rod. Thanking you,—I am, etc.,

W. J. BOTES.

Waterkloof, District Philipstown, 29th July.

How to Use the Divining Rod.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In your latest issue I notice that Mr. J. D. Beneke asks how to work with the divining rod or water stick. There are different ways in which to handle the rod, and in my experience I have often observed the effect of the rod, if it is handled in the wrong way.

The wood to be used may be of almost any kind of tree, provided it is wet or green. The reason for that is to conduct the magnetic current from the vein of water between wood and bark to the end of the forked branch. Quince, willow, apple, taaibosch, are all very suitable for this purpose, because they are flexible without breaking. The branch should be forked, just like the branch of a catapult. The upper part should be about 3 to 4 inches in length, and the two ends 12 inches, about ⅜ to ½ inch thick. Both of the ends should be held by both hands, with the thumbs outwards, along the wood. The rod should be almost erect, with the point at about 95° forward, at about the height of your chin; elbows well backward and close to the sides.

If Mr. Beneke should like to know more about veins and currents, I am willing to give him information.—Yours, etc.,

H. J. H. CLAASSENS, junr.

Osfontein, Victoria West.

Rams and Ewes.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In reply to a question of Mr. G. C. Snijman about the shearing of rams, I wish to tell Mr. Snijman briefly that when he writes about putting 18 rams to 150 ewes, the thought involuntarily occurs to my mind "this must certainly be a counter-farmer." If you should have put 30 rams to those 150 ewes, you would probably not have got a single lamb. My experience of farming has taught me that the wool is no obstacle to either ram or ewe in breeding, no matter what the length of it may be. As to rams, if he had put 3 rams to the 150 ewes for the same period, he would have had a good harvest of lambs. One ram to every 50 ewes is quite sufficient. But if you feed the rams daily, 2 rams are quite ample for 150 ewes.—Yours, etc.,

A. S. J.

Britstown, July, 1908.

A Predaceous Owl.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In connection with the remarks of "Like to Know" in your July number about owls under the above heading, I should like to state, although only bearing indirectly on the subject, that a few weeks ago an owl, which slept in my stable, was found eating the head of a fowl he had just killed, while a second fowl he had also killed was at his feet. Needless to say, the owl was shot.—Yours, etc.,

SOUTH AFRICAN.

Walfish Bay, August 9.

Port Jackson Willow—A Correction.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I am sorry there is a small mistake in my correspondence on Port Jackson willow. I did not say that small stock is fond of the seed, but that poultry, fowls, and turkeys are. You would oblige me by having that corrected.—Yours, etc.,

J. D. BENEKE.

Ruiterbosch, Mossel Bay.

Malkop in Small Stock.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Some years ago a disease made its appearance among small stock, commencing in angora goats, but it spread afterwards and attacked also Boer goats and Afrikander sheep. The symptoms of the disease are as follows: First the animal does not seem to take any notice of the flock, with which it is grazing, it constantly keeps its head upwards, and after keeping on in that way for a few days it wanders away from the others, and does not eat anything, so to say. It gets worse and worse, until at last it dies. I don't know of a single case where an animal has recovered. We call it here "malziekte." Dr. Heinrichs has examined such a goat, and stated that the cause was a water-bladder pressing on the brain. But he did not know of a remedy. I will be much obliged if a reader of the *Journal* will tell us of a remedy.

"BOER."

District Murraysburg.

The above affection, known as Malkop in South Africa and as "Gid," "Sturdy," and "Turnsick" among British farmers, is caused by the presence of a cystic parasite or bladder worm which lives in the brain cavity. The parasite is called *Coenurus cerebralis*, and is the cystic or intermediate stage of the tapeworm of the dog, called *Taenia coenurus*. The sheep or goats become infested by picking up the eggs of this tapeworm, which are scattered all over the veld, and into the drinking water, by dogs or similar carnivora which are infested with the tapeworm. The best remedy is prevention. Farmers should be careful to keep all the farm dogs free of tapeworm by frequent dosing when they are suspected; and the next is to be exceedingly careful that the dogs do not get the heads containing these bladder worms to eat.

Wire Worm in Sheep.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Several letters having appeared from time to time in your *Journal* in connection with the above, I would like to give my experience in the cure of wireworm in sheep.

I had a flock of lambs (yearlings) badly infested with wireworm. I mixed a lot of salt water and put it in troughs to which the flock had access. Some hours after they had had a drink of the mixture I found three dead and a couple more on the point of death. I had a *post-mortem* on the five or six, and found the fourth stomach a mass of wireworm, *but the worms were all dead.* I then made the solution very much weaker (just brakish), and added a little lime, and had no more deaths. After a few days I made the solution much stronger—in fact, added more salt than the water could dissolve, but with no bad results. In six weeks these were the best-conditioned sheep on the farm, and perfectly cured.

Bluestone, which has always been considered the correct treatment, is always dangerous to use. As to "Bert Bowker's Cure" I am not in a position to speak, never having used it, but judging from Mr. A. Walsh's experience it is a very good mixture.

I can, however, strongly recommend the salt water cure, which has the merit of being both cheap and simple. Another very great advantage is that the sheep will help themselves, thus saving catching and handling of each sheep, with the consequent worry to the animal. This I look upon as a very great consideration. Sheep take very readily to the mixture. Trusting this will be of some use to my brother farmers.—Yours, etc.,

A. C. McDONALD, JUNR.

Lilyfountain, near Tarkastad, August 27.

Fodders and their Nutrient Values.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I shall be glad if you will permit me to correct a series of figures appearing on page 101 of the *Agricultural Journal* in connection with my paper on "Fodders and their nutrient values." The column headed "Fuel value (excluding fibre)" should have read as follows:—

1,631.
1,109.
1,518.
1,606.
1,588.
1,292.
1,266.
1,117.
1,050.
1,473.
1,381.

Two other errors occurring in the same article in each case entirely alter the sense: on page 101 the word "below" should have been inserted after "about one-third," and in the footnote on page 100 the word "stover," where it occurs for the *second* time, should read "Storer."

CHAS. F. JURITZ.

24th August, 1908.

Results of Sheep Shearing with Machines.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—It was first of all with regret that I read Mr. C. W. Webster's letter in your May issue, as at that time I was just getting two shearing machines from England through Messrs. Malcomess and Co., of East London—the "Wolseley machine."

These two machines are now being worked by water power, and at first I was very much discouraged by the results, having had almost the same experience as Mr. Webster. I wrote to Messrs. Malcomess for further instructions, *re* sharpening, etc., etc. This firm kindly wrote to a Mr. McKee, a brother of the Cape wool expert, and sent me the following reply:—"For Wolseley machine"—Revolutions of main shaft, between four and five hundred per minute. Great care to be taken *re* sharpening and

to watch the tension screw. Further *re* sharpening of cutters. The Wolseley Company could supply me with their special machine at £7 10s. However, before receiving this information I found out things for myself, with local assistance; erected an Emery-stone (also worked by water power), and could sharpen half-a-dozen combs, 4 dozen cutters, in little over half-an-hour. The first day my overseer and I only sheared 45 sheep, the second day 36, and both days I was clipping three sheep to my overseer's two. These were all clipped with new cutters, and the sheep were very much tortured, especially the second day. The third day I did not shear at all, and then erected my Emery wheel and had all combs and cutters thoroughly sharpened. I may here state that with these difficulties I got two men with ordinary shears and made them clip the inside of the legs and belly and just clean a ring round the head as I found it awkward in getting clippers round the ears and horns. This practice I am still continuing because it tends to keep the cutters sharp much longer, and one as a rule keeps these wools separate. I am, however, confident that next shearing season no ordinary shears will be required. The fourth day my overseer was alone and did 52 sheep. Since then I have timed repeatedly and find that every 4½ minutes he lets his sheep go. It is really now a pleasure to watch him strip the wool off, and one can never realise how clean the clip is. I have, therefore, every faith in the Wolseley shearing machine, and can conscientiously recommend them. In fact, I declare them perfect. Yet one will always have some trouble before you get to know them. It is my intention to get two extra clippers so that a small boy could always clean them, as I find much time is lost by shearers in cleaning their clippers. With these privileges each shearer will do his 100 sheep a day, but not otherwise. It will be gathered from the above that I do not see how sheep-shearing by hand power can be of any use; at all events, in my opinion it could not compete with ordinary shears.

I fear, Mr. Editor, that I have already taken too much of your space, but I would like to point out to Messrs. Alexander and Co., who wrote against Mr. Webster in your July issue, that it would be very advisable to supply sharpeners with their machines, that is if they wish to foster the sale of their machines. It is very hard for a farmer to spend money on these things and when he is ready to do the work finds that he requires something else before he is able to go on with his work, which in such cases would mean that, being ready for shearing, he has to revert to the ordinary shears and leave his machines idle until next shearing season. We have always an infernal "trick of the trade" to overcome which tends to hamper progressive methods considerably. Take, for instance, an ordinary self-binder machine, which costs £38 new and complete. You will find that by putting one together by purchasing extras it would run you to just on £100 or over.

I have to thank Mr. C. E. Liebenberg, of Piquetberg, for his ready assistance, and would suggest to all those in this and adjoining districts who wish to invest in shearing machines to obtain his services.—Yours, etc.,

PIETMAN RETIEF.

Steenebrug, Piquetberg, August 20, 1908.

NOTES ON THE WEATHER OF JULY, 1908.

By Thomas W. Rees, B.A., LL.M., Assistant Secretary to the Meteorological Commission.

A mean temperature a little higher than the normal, an almost entire absence of strong winds, a few local thunderstorms, a mean rainfall in most cases below the average, some light falls of snow in the early part of the month, an unusually small number of fogs, were the leading features of the weather of July.

Division.	Mean Rainfall (1908).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	3·11	10	6·39	12	—2·98	— 47
South-West ...	1·92	7	3·10	7	—1·18	— 38
West Coast ...	1·04	4	1·50	5	—0·46	— 30
South Coast ...	1·88	8	1·41	5	+0·47	+ 33
Southern Karoo ...	0·58	4	0·64	3	—0·06	— 9
West Central Karoo ...	0·56	2	0·31	2	+0·25	+ 80
East Central Karoo ...	0·19	1	0·24	2	—0·05	— 21
Northern Karoo ...	1·09	2	0·34	2	+0·75	+220
Northern Border ...	1·18	4	0·17	1	+1·01	+594
South-East ...	0·23	2	0·62	2	—0·39	— 63
North-East ...	0·50	2	0·56	2	—0·06	11
Kaffraria ...	0·07	1	0·52	2	—0·45	— 86
Basutoland ...	0·45	3	0·64	2	- 0·19	— 30
Orange River Colony...	...	...	0·48	2	...	...
Durban (Natal) ...	0·40	3	1·30	...	—0·90	— 69
Bechuanaland ...	1·38	4	0·33	1	+1·05	+318
Rhodesia ...	0·43	2	0·02	1	+0·41	+2050

Precipitation.—The mean rainfall, based on the records from 364 stations, amounted to 1·03 ins., falling on 4 days, being 0·29 ins., or 22 per cent. less than the average, and less than half the amount recorded in June. The accompanying table shows that the deficiency was greatest over Kaffraria, where it was 86 per cent. below the average, the least deficiency (11 per cent.) being over the North-East. The rainfall was very considerably above the average in Rhodesia, the Northern Border, Bechuanaland and the Northern Karoo, and only slightly so over the West Central Karoo and South Coast. On summarising the monthly totals it is found that 31 had no rainfall; 137 had 0·01—0·50 in.; 57 had 0·51—1 in.; 82 had 1·01—2 ins.; 34 had 2·01—3 ins.; 12 had 3·01—4 ins.; 7 had 4·01—5 ins.; leaving 4 stations with more than 5 ins. These were all on Table Mountain, viz.: St. Michael's, with 7·53 ins.; Kasteel's Poort, with 6·35 ins.; Waai Koppe, with 6·20 ins.; and Devil's Peak, with 5·48 ins. On similarly analysing the precipitation in one day, it is seen that of the 359 stations rendering the necessary data, and excluding the 30 having "Nil," 183 had 0·01—0·50 in.; 93 had 0·51—1·00 in.; 39 had 1·01—2 ins.; whilst only 4 stations had maxima of 2 ins. or over. The heaviest falls were 2·91 ins. at Cape Agulhas;

2·50 ins. at Danger Point; 2·10 ins. at Prieska; 2·05 ins. at Bredasdorp, and 2·00 ins. at Karnernelks River. These falls all occurred on the 12th. *Thunderstorms* occurred at 62 stations on 7 days, chiefly on the 11th and 13th. *Hail* was noted at 3 stations on two days. *Snow* fell at Dunedin (Beaufort West) on the 12th; at Zwartberg Pass on the 5th; at Spitzkop (Graaff-Reinet) on the 11th; and at Cata, near King Williamstown, on the 6th. It is reported from the two first-mentioned stations that the ground was wholly covered.

Temperature, Cloud, and Wind.—The mean temperature of all stations was 53·2°, which is 1·0° higher than the average and 0·7° above the mean for June last. The increase in temperature was due to the nights being warmer than usual. The mean night temperature (42·1°) being 2·3° above the normal, whereas the day temperature, 64·3°, is only 0·3° less than the average. The mean warmest station was Port St. John's with a temperature of 60·2°, practically the same as it was there in June last, and the mean coldest Hanover with 42·4°, a difference of 17·8°. The highest mean maximum was 71·3° at Mount Ayliff, and the lowest mean maximum 25·5° at Hanover. The warmest days were most generally 21st, 22nd, 24th, 29th and 31st; a few maxima were, however, noted on other dates. The coldest mornings were those of the 4th, 6th, 7th, 8th and 9th. The mean of the highest readings was 77·1°, or 1·3° higher than in June, and the mean of the lowest readings was 32·8°, or 0·9° lower than the previous month, showing a mean monthly range of 44·3°. The highest temperature at any station for the month was 90·0° on the 22nd at Port Nolloth, whilst the lowest temperature was 14·0° on the 4th at Hanover, an extreme monthly range of 76·0°, as compared with 71·0° last month, and 69·0° in the corresponding month last year. *Frosts* were again of daily occurrence, though not nearly as numerous as last month, only 227 being noted as against 600 last month. These were mostly noted on the 6th, 7th and 8th. Some of these frosts were very severe, especially in the Aliwal North and Queenstown districts. *Fogs* were only noted from 84 stations, on every day of the month with the exception of the 7th and 26th, being most numerous 12th, 13th and 22nd. The mean amount of *Cloud* was 41 per cent., being 2 per cent. more than the previous and 14 per cent. more than in the same month last year. The amount of sky obscured was above the average over the Cape Peninsula, West Coast, South Coast, Southern Karoo and South-East, but below the average over Bechuanaland, Rhodesia, Northern Karoo and Northern Border. The cloudiest station was Disa Head (Table Mountain) with 64 per cent., closely followed by Port St. John's with 61 per cent. The clearest skies were at Tabankulu with 12 per cent. and Kuruman with 17 per cent. The prevailing morning *Winds* along the Coast were Easterly at Port Nolloth, South-Westerly at Cape Point, Westerly at Danger Point and Cape Agulhas, North-Westerly at Mossel Bay, Westerly at Cape St. Francis, North-Westerly at Port Elizabeth and East London, and Westerly at Port St. John's and Durban. Inland the wind direction was variable, being Southerly at Kuruman, South-Westerly at Stutterheim and Murraysburg, North-Westerly at Rietfontein and Aliwal North, South-Easterly at Hopetown and Kenhardt. The mean *Wind-force* on the Beaufort Scale (1—12) was 1·78, corresponding to a mean velocity of 11·6 miles per hour. The wind was strongest along the South Coast and South-East, and of least force over the Northern Karoo. *Gales* were only reported from 15 stations on 11 days. *Hot Winds* were experienced at 5 stations on 4 days, and an *Earthquake* shock was felt at Kokstad on the 6th.

OBSERVERS' NOTES.

VRUCHTBAAR (Wellington).—All cereal crops in splendid condition. Early fruits begin to blossom and promise good crops.

UITENHAGE (Park).—A dry but, on the whole, seasonable month. Three white frosts (slight); five hot winds.

THEEFONTEIN (Hanover).—Frequent severe frosts during month. Rains on 11th and 12th (1·17 ins.) are the heaviest recorded for July since 1890, nearest to it being 1·11 ins. in 1899. Fog on 13th, 14th and 15th. Last five days of month warm and summery.

WAVERLEY (Queenstown).—Very warm month. Very little wind and frosts; exceptionally mild for July.

FORT BEAUFORT.—Mild weather. Fruit trees and vines budding. No winter weather yet. Country dry; rivers low.

HUXLEY FARM (Stutterheim).—The weather on the whole very mild, in fact, some days very hot, and a remarkable absence of high winds. All live stock doing well. Grass is beginning to shoot out green.

CASTLE HILL (Aliwal North).—Only seven severe frosts this month.

LAURISTON (Barkly East).—Ground is nice and damp, and farmers anticipate an early spring.

MIDDLECOURT (Wodehouse).—This has been a very dry month, and plenty of promise but no rain. Weather very much milder than July, 1907.

THIBET PARK (Queenstown).—Very dry during last half of month. Very severe frosts the whole month.

ELLIOTDALE.—Very dry, with variable winds.

KOKSTAD.—Severe frosts to the 20th of the month. Weather now mild, and country dry and parched.

CARNARVON FARM.—Rainfall during month has been very disappointing, only ·08 of an inch being registered. Though on several other occasions during the month the weather was very promising, nothing more was registered. The number of windy days this month constitute a record for the past eight years—28,—while the number of frosts and cloudless days was below the average.

Owing to the fine rains in June large quantities of grain were sown, but already crops are beginning to look bad for want of rain. Stock of all kinds have been doing well so far, but are beginning to fall off in condition now. As there is, however, every prospect of an early spring, only the poorest stock is likely to succumb from poverty. Appended is a tabular statement for past eight years :

Year.	Rain.	Frost.	Wind.	Cloudless Days.
1901	0·37	26	16	5
1902	0·49	22	15	12
1903	0·18	23	16	6
1904	0·00	24	13	9
1905	0·00	24	16	5
1906	0·01	15	8	13
1907	0·13	23	3	10
1908	0·08	21	28	1

KOKSTAD (Coyle).—The winter so far has proved remarkably mild. There has been no snow at all, even on the hills. The total absence of cold winds has meant much to stock. Peaches in sheltered places are already in blossom. Rain is needed. A shock of earthquake was felt on the night of the 5th.

PORT ST. JOHN'S.—The first frost for 26 years was experienced on the 6th.

TEMPERATURE—JULY, 1908.

Stations.	Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory ...	62·7	47·2	55·0	78·1	24	42·8	6
Simonstown ...	65·9	51·7	58·8	78·1	24	47·5	5
Table Mountain (Disa Head)	53·4	43·2	48·3	67·3	20	38·0	5 & 6
Cape Town (S.A. College) ...	64·5	47·8	56·1	81·0	24	41·0	7
Devil's Peak ...	58·9	45·3	52·1	73·0	24	38·0	5
Bishopscourt ...	63·4	48·4	55·9	78·0	24	41·0	3
Wynberg ...	62·4	46·5	54·4	76·5	21	42·0	3 & 18
Groot Constantia ...	58·0	44·5	51·2	78·0	24	43·0	6 & 17
Elsenberg (Agri. College) ...	62·1	40·8	51·5	76·6	24	34·8	7
Danger Point ...	60·2	51·8	56·0	67·0	21	43·0	26
Robertson (Plantation) ...	64·4	38·3	51·4	78·0	24	30·0	6
Port Nolloth ...	62·8	41·5	52·0	90·0	22	32·5	9 & 10
Cape Agulhas ...	61·6	50·0	55·8	77·0	21	43·0	17
Mossel Bay ...	64·3	46·2	55·3	77·0	21	39·0	7
Port Elizabeth ...	67·9	50·4	59·2	80·0	24	44·0	7 & 8
Heidelberg ...	67·4	40·8	54·1	81·0	24	32·0	7
Cape St. Francis ...	64·5	49·3	56·9	82·0	1	42·0	7 & 8
Van Staaden's ...	66·4	48·5	57·4	82·0	31	36·0	6
George (Plantation) ...	62·8	45·8	54·3	78·0	24	39·0	7
Concordia (Plantation) ...	63·4	48·8	56·1	79·0	24	39·9	7
Amalienstein ...	66·7	36·5	51·6	81·0	1	28·0	7 & 8
Murraysburg ...	61·5	33·3	47·4	72·0	31	16·0	17
Hanover ...	59·3	25·5	42·4	67·0	31	14·0	4
Hope Town ...	65·0	34·5	49·8	77·0	31	19·0	7
Kenhardt ...	67·0	38·0	52·5	78·0	31	20·0	7
Kimberley ...	66·5	37·0	51·8	76·5	29	23·0	8
Stutterheim ...	67·0	43·9	55·4	76·5	1	32·3	8
Sydney's Hope ...	64·4	45·2	54·8	77·5	28	37·0	7
King William's Town ...	70·7	41·8	56·2	85·0	1 & 28	31·0	7
Bedford ...	66·0	41·1	53·5	76·0	2	30·0	8
East London ...	67·7	49·0	58·4	76·0	2	42·0	8 & 9
Evelyn Valley ...	60·6	44·0	52·3	74·0	1	36·0	6, 7, & 8
Rietfontein (Aliwal North)...	58·8	32·0	45·4	69·0	31	20·8	6 & 8
Aliwal North ...	64·1	30·5	47·3	75·0	31	17·0	8
Mount Ayliff ...	71·3	41·5	56·4	82·5	25	30·0	6 & 9
Tabankulu ...	66·5	39·4	53·0	76·3	25	28·3	6
Kokstad ...	64·9	29·9	47·4	75·1	29	20·0	8
Umtata ...	70·4	39·2	54·8	82·0	28	27·0	8
Port St. John's ...	70·5	50·0	60·2	84·0	29	43·0	6
Main ...	66·8	40·8	53·8	78·0	31	29·5	8
Teyateyaneng ...	59·5	32·0	45·7	68·0	16	20·0	7
Kuruman ...	64·1	34·4	49·2	73·0	31	21·0	3
Hope Fountain ...	67·9	43·0	55·4	77·5	17	37·0	23
Means ...	64·3	42·1	53·2	77·1	...	32·8	...
Extremes ...	...	...	...	90·0	22	14·0	4

RAINFALL, JULY, 1908.

I. CAPE PENINSULA:	INS.
Royal Observatory (*a*) 12 in. gauge	2·68
Cape Town, Fire Station ...	2·90
Do. South African College	3·15
Do. Molteno Reservoir ...	3·76
Do. Platteklip ...	4·47
Do. Signal Hill ...	2·48
Do. Hospital ...	
Sea Point, The Hall ...	2.29
Do. Attridge ...	
Camp's Bay	2·77
Table Mountain Disa Head ...	4·11
Do. Kasteel Poort ...	6·35
Do. Waai Kopje ...	6·20
Do. St. Michael's ...	7·53
Devil's Peak Blockhouse ...	5·48
Do. Nursery ...	4·85
Do. Lower Gauge ...	
Woodstock, The Hall ...	3·33
Do. Municipal Quarry ...	3·83
Do. do. Nipher's Shield	4·46
Newlands, Montebello ...	4·01
Claremont, Carrigeen ...	
Bishopscourt	2·77
Kenilworth	2·38
Wynberg, St. Mary's ...	2·26
Groot Constantia	2·27
Tokai Plantation	2·48
Plumstead, Culmwood ...	1·61
Muizenburg (St. Res.) ...	
Fish Hoek	
Simon's Town, Wood ...	2·51
Do. Gaol ...	
Cape Point	1·28
Blaauwberg Strand	
Robben Island	1·05
Durbanville	
Maitland Cemetery	1·88
Tamboer's Kloof (Cape Town) ...	3·27
Woodhead Tunnel (Table Mountain)	4·91
Lower Reservoir, Table Mountain	4·00

II. SOUTH-WEST:	INS.
Eerste River	1·22
Klapmuts	1·98
Stellenbosch, Gaol	2·10
Somerset West	1·45
Paarl	1·65
Wellington, Gaol	2·03
Do. Huguenot Seminary	
Groot Drakenstein, Weltevreden	
Porterville Road	1·36
Tulbagh	1·10
Ceres Road	
Kluitjes Kraal	1·81
Ceres	
The Oaks	1·62
Rawsonville	1·41
Caledon	1·87
Worcester, Gaol	1·64
Worcester, Station	
Hex River	1·39

II. SOUTH-WEST (*continued*):	INS.
De Doorns	
Karnmelks Rivier	2·90
Lady Grey, Division Robertson...	
Robertson Gaol	2·10
Do. Govt. Plantation ...	1·87
De Hoop	1·99
Montagu	
Danger Point	3·20
Vygebooms Rivier	2·11
Elgin Plantation	2·41
Elsenberg Agricultural College	1·84
Berg River Hoek	
Wemmer's Hoek	
Roskeen	2·44
Vruchtbaar	1·95

III. WEST COAST:	INS.
Port Nolloth	0·09
Do. (Lieut. Barber) ...	1·37
Anenous	0·97
Klipfontein	0·95
Kraaifontein	
O'okiep	
Springbokfontein	0·66
Concordia	
Do. (Kraphol)... ...	0·70
Garies	0·75
Lilyfontein	
Van Rhyn's Dorp	1·07
Clanwilliam Gaol	0·42
Do. (Downes) ...	
Dassen Island	
Kersefontein	1·40
The Towers	1·52
Abbotsdale	
Malmesbury	1·47
Piquetberg	1·65
Zoutpan	
Wupperthal	1·13
Welbedacht	
Hopefield (Gaol)	1·43
Algeria (Clanwilliam) ...	0·90
Cedarberg (do.)	1·18

IV. SOUTH COAST:	INS.
Kaap Agulhas	4·60
Bredasdorp	3·04
Swellendam	2·76
Potberg	
Zuurbraak	2·09
Grootvaders Bosch	3·40
Heidelberg	1·37
Riversdale	1·25
Melkhoutfontein	
Vogel Vlei	1·50
Geelbek's Vlei	
Mossel Bay	1·41
Groot Brak River	0·88
George	2·14
Do. (Plantation)... ...	1·63
Do. (Woodifield)... ...	1·14
Eseljagt	
Millwood	

IV. SOUTH COAST (*con.*):

	INS.
Sourflats	1·46
Concordia	1·21
Knysna	2·37
Buffel's Nek	2·46
Plettenberg Bay	1·98
Harkerville	3·03
Forest Hall	
Blaauwkrantz	1·79
Lottering	1·58
Storms River	
Witte Els Bosch	2·07
Humansdorp	1·33
Cape St. Francis	3·63
Hankey	
Witteklip, Sunnyside	0·99
Van Staden's, Intake	0·72
Do. On Hill	0·95
Kruis River	
Uitenhage (Gaol)	0·62
Do. (Park)	0·63
Do. (Inggs)	
Armadale, Blue Cliff	
Dunbrody	
Port Elizabeth (Harbour)	2·28
Do. (Victoria Park)	
Do. (Walmer Heights)	2·69
Shark's River (Nursery)	2·48
Do. (Convict Station)	2·17
Tankatara	
Centlivres	0·31

V. SOUTHERN KAROO:

Verkeerde Vlei	
Bok River	
Triangle	
Touws River	
Do. (D.E. Office)	
Pietermeintjes	
Grootfontein	
Ladismith	0·72
Amalienstein	0·77
Seven Weeks' Poort	
Calitzdorp	0·54
Oudtshoorn	0·33
Vlakte Farm	
Uniondale	1·15
Kleinpoort	0·00
Glenconnor	
Rust en Vrede	

VI. WEST-CENTRAL KAROO:

Matjesfontein	
Laingsburg	
Prince Albert Road	
Fraserburg Road	0·41
Prince Albert	0·43
Zwartberg Pass	1·64
Booi's Kraal, Beaufort West	
Beaufort West (Gaol)	0·60
Dunedin	0·82
Nel's Poort	0·44
Camfers Kraal	0·29
Lower Nel's Poort	
Krom River	0·61
Roosplats	0·76
Baaken's Rug	0·47
Willowmore	0·34
Rietfontein	0·19
Steytlerville	0·06
Lemoenfontein, Beaufort West	0·84

VII. EAST-CENTRAL KAROO:

	INS.
Buffels Kloof	
Aberdeen (Gaol)	0·20
Do. Bedford	
Corndale	0·16
Aberdeen Road	
Klipplaat	
Winterhoek	
Klipdrift	
Kendrew, Holmes	0·12
Do	0·00
Graaff-Reinet (Gaol)	0·20
Do. (Eng. Yard)	0·19
Do. (College)	
New Bethesda	0·23
Roodebloem	0·18
Glen Harry	0·30
Wellwood	0·31
Do. Mountain	0·37
Bloemhof	0·25
Jansenville	0·10
Patrysfontein	
Bethesda Road	
Afrikander's Kloof	
Roode Hoogte	1·03
Toegedacht	0·14
Klipfontein	0·23
Cranemere	0·13
Pearston	0·10
Darlington	
Walsingham	
Arundale	
Doornbosch, Zwagershoek	
Middlewater	0·08
Somerset East (Gaol)	0·04
Do. Do. College	
Longhope	
Cookhouse	0·03
Middleton	0·00
Spitzkop, Graaff-Reinet	0·21
Bruintjes Hoogte	0·00
Grobbelaars Kraal	0·13

VIII. NORTHERN KAROO:

Calvinia	0·84
Middlepost	
Brandvlei	
Onderste Doorns	
Sutherland	0·79
Fraserburg	1 65
Scorpions Drift	1·75
Rheboksfontein	
Klein Vlei	
Carnarvon	1·81
Loxton	
Beyersfontein	
Wagenaars Kraal	
Brakfontein	0·73
Victoria West	1·21
Omdraais Vlei	
Doornkuilen	
Britstown	1·87
Wildebeestkooij	2·00
Murraysburg	0·62
De Kruis, Murraysburg	0·11
Richmond	1·49
De Aar	
Middlemount	
Hanover	1·55
Theefontein	1·17
Zwagersfontein	

VIII. NORTHERN KAROO (*con.*):

	INS
Philipstown	1·49
Boschfontein	..
Petrusville	1·46
The Willows, Middelburg	1·46
Naauwpoort	...
Middelburg (Gaol)	1·24
Do.	...
Do. (Government Farm)	
Jackalsfontein	...
Ezelpoort	...
Plaatberg	...
Grape Vale	...
Ezelfontein	...
Roodepoort	...
Groenkloof	...
Vlakfontein	...
Vogelsfontein	...
Plaatfontein	...
Colesberg	2·32
Tafelberg Hall	0·49
Rietbult (Colesberg Bridge)	...
Fish River	0·34
Varkens Kop	0·53
Culmstock	...
Droogefontein	0·50
Stonehills	...
Cradock (Gaol)	0·38
Witmoss ...	0·00
Varsch Vlei	...
Maraisburg	0·50
Steynsburg (Gaol)	1·24
Riet Vlei	...
Hillmoor	1·04
Quagga's Kerk	...
Tarkastad	0·34
Do. (District Engineer)	0·24
Drummond Park	...
Glen Roy	...
Waverley	0·28
Gannapan	...
Montagu...	...
Grape Vale	...
Rietfontein, Cradock	...
Schuilhoek	1·47
Vosburg ...	1·90
Zwavelfontein	1·96
Holle River (Colesberg)	...
The Meadows, Schoombie	...
Cradock Station	0·33
Hartebeestefontein, Steynsburg	1·32

IX. NORTHERN BORDER:

	INS
Pella	0·60
The Halt	0·59
Keimoes ...	...
Kenhardt	1·33
Upington	0·82
Trooilapspan	1·82
Van Wyk's Vlei	1·61
Prieska ...	...
New Year's Kraal	...
Dunmurry	1·93
Karree Kloof	...
Griquatown	0·92
Campbell	...
Douglas ...	0·83
Avoca, Herbert	...
Hope Town	1·11

IX. NORTHERN BORDER (*con.*):

	INS.
Orange River	...
Newlands, Barkly West	0·80
Barkly West	0·99
Bellsbank	...
Kimberley (Gaol)	0·87
Do. Stephens	1·00
Strydenburg	...
Douglas (Voss)	0·84

X. SOUTH EAST:

	INS.
Melrose (Div. Bedford)	0·11
Dagga Boer	0·27
Fairholt ...	0·12
Lynedoch	...
Alicedale	...
Cheviot Fells	0·50
Bedford (Gaol)	0·10
Do. (Hall)	0·05
Sydney's Hope	0·63
Cullendale	...
Adelaide...	0·05
Atherstone	0·61
Alexandria	1·66
Salem ...	...
Fort Fordyce	0·07
Fountain Head	...
Graham's Town (Gaol)	0·38
Do.	...
Heatherton Towers ...	...
Sunnyside	0·40
Vischgat...	..
Fort Beaufort	0·00
Katberg ...	0·00
Balfour ...	0·09
Seymour...	0·10
Glencairn	0·41
Alice ...	...
Lovedale...	...
Port Alfred	0·00
Hogsback	0·22
Peddie ...	0·20
Exwell Park	0·00
Keiskamma Hoek	0·11
Cathcart (Gaol)	0·10
Do. (Foreman)	0·11
Do. ...	0·20
Thaba N'doda	0·00
Evelyn Valley	0·59
Crawley ...	0·17
Thomas River	0·16
Perie Forest	0·39
Forestbourne	0·84
Isidenge ...	0·55
Kologha ...	0·30
King William's Town (Gaol)	0·14
Do. Do. (Dr. Egan)	0·17
Stutterheim, Wylde...	...
Do. Bousfield	0·16
Fort Cunynghame	0·07
Dohne ...	...
Kubusie ...	...
Quacu ...	0·25
Blaney ...	...
Kei Road	...
Berlin ...	...
Bolo ...	0·07
Fort Jackson	0·00
Prospect Farm, Komgha	0·30
Komgha (Gaol)	0·27

X. SOUTH-EAST (*continued*):	INS.
Chiselhurst	0·49
East London West	0·35
East London East	
Cata	0·07
Wolf Ridge	0·20
Dontsah	0·29
Mount Coke	0·10
Blackwoods	0·10
Albert Vale (near Bedford)	0·02
Huxley Farm (Stutterheim)	0·07
XI. NORTH-EAST:	
Venterstad	0·95
Mooifontein	2·35
Burnley, Cyphergat	
Burghersdorp (Gaol)	1·28
Ellesmere	0·61
Molteno	1·09
Lyndene	0·42
Cyphergat	
Thibet Park	0·33
Sterkstroom (Station)	0·32
Do. (Gaol)	
Rocklands	
Aliwal North (Gaol)	0·48
Do. (Brown)	
Do. (Dist Engineer)	0·41
Buffelsfontein	
Hex's Plantation	
Poplar Grove	
Carnarvon Farm	0·08
Halseton	0·00
Jamestown	0·33
Whittlesea	0·36
Queenstown (Gaol)	0·03
Do. (Beswick)	
Rietfontein (Aliwal North	1·21
Middlecourt	0·07
Dordrecht	0·10
Tylden	0·00
Nooitgedacht	
Herschel	0·52
Lady Grey	0·76
Lauriston	0·39
Lady Frere	0·00
Contest (near Bolotwa)	
Sterkspruit	
Doornkop	
Avoca, Barkly East	
Keilands	0·00
Palmietfontein	0·30
Barkly East	
Blikana	
Gateshead	
Cliftonvale	
Albert Junction	1·00
Queenstown (Dis. Eng'rs Office)	
Hughenden	0·42
Glenwallace	
Indwe (District Engineer's Office)	0·00
Bensonvale Inst., Herschel	0·57
Cathcart, Queenstown	
Royal, Div. Albert	
Lady Grey Station	0·78
Dordrecht Station	0·08
Stormberg Junction	1·11
Broughton, Molteno	1·00
Hopewell, Imvani	0·08
Sunny Meade, Div. Albert	1·02
Castle Hill, Aliwal North	0·25

XII. KAFFRARIA:	INS
Ida, Xalanga	
Slaate, Xalanga	0·00
Cofimvaba	0·00
Tsomo	0·05
N'qamakwe	0·07
Main	0·07
Engcobo	0·06
Butterworth	0·08
Woodcliff	
Kentani	0·25
Maclear	0 10
Idutywa	0·05
Bazeya	0·00
Willowvale	0·28
Mount Fletcher	0·15
Somerville, Tsolo	0·00
Elliotdale	0·00
M'quanduli	
Matatiele	
Umtata	0·03
Cwebe	0·19
Tabankulu	0·00
Mount Ayliff	0 00
Kokstad	0·02
Do., The Willows	0·04
Seteba	0·15
Flagstaff	0 00
Insikeni	0·15
Port St. John's	0·09
Kilrush, Sneezewood	
Umzimkulu	0·00
Mandileni	
Wanstead	
Cedarville	
Tent Kop, Elands Height	0·16
Umzimkulu (Strachan)	0·00
Waterfall Farm (Kokstad)	0·05
Confluence, Matatiele	0·00
XIII. BASUTOLAND:	
Mafeteng	0·64
Mohalies Hoek	0·49
Maseru	0·36
Teyateyaneng, Berea	0·55
Moyeni Quthing	
Qacha's Nek	0·21
Leribe	
Butha Buthe	
XIV. ORANGE RIVER COLONY:	
Bloemfontein	
XV. NATAL:	
Durban, Observatory	0·40
XVI. TRANSVAAL:	
Johannesburg	
XVII. BECHUANALAND:	
Taungs	0·52
Vryburg	0·91
Mafeking	2·33
Setlagoli	1·39
Kuruman	1·73
Zwartlaagte	
XVIII. RHODESIA:	
Hopefountain	0·92
Rhodes Matoppo Park	0·30
Edwaleni	0·06
XIX. DAMARALAND:	
Walfish Bay	

MILK RECORD.

ELSENBURG COLLEGE HERD.

Subjoined is the Milk Record to the 31st August, 1908 :-

Breed and Cows.	Days in Milk.	Yield in Lbs.		
		During August.	Total to date.	Daily Average.
FRIESLANDS.				
Cleopatra	193	985	8,109	42·0
Daisy	171	203	2,130	12·4
Romula	168	872	5,437	32·4
Victoria	158	1,147	5,250	33·2
Bell	52	1,397	2,175	41·8
Violet	32	1,188	1,204	37·6
Rose	11	357	357	32·4
JERSEYS.				
Nora	213	532	3,739	17·5
Gladys	112	801	2,634	23·5
Gertie	74	855	1,987	26·8
Rosa	52	654	1,054	20·3
Grace	46	723	1,030	22·4
Gwendolen	15	159	159	10·6
Gilliflower	3	94	94	31·3
AYRSHIRES.				
Cherry	95	584	2,620	27·6
Lobelia	70	780	2,048	29·2
Queen Dot	62	777	1,804	29·1
SHORTHORN.				
Maggie	52	1,259	1,980	38·1
CROSSES.				
Bessie	293	906	9,924	33·9
Disa	168	607	3,827	2·28

MILK RECORD.

ELSENBURG COLLEGE HERD.

Summary for Last Lactation period to 31st July, 1908.

Breed and Cows.	Total days in Milk.	Total Yield	
		In Gallons.	In Bottles.
FRIESLANDS.			
Romula	383	1,009	6,054
Victoria...	372	829	4,974
Cleopatra	296	824	4,944
Violet	316	724	4,344
Bell	307	643	3,858
Rose	274	566	3,396
JERSEYS.			
Hylda	418	867	5.202
Gladys	299	776	4,656
Gertie	275	729	4,434
Gilliflower	442	692	4,152
Gwendolen	300	571	3,426
Fuschia...	301	511	3,066
Grace	347	466	2,796
Rosa	269	428	2,568
AYRSHIRES.			
Queen Dot	294	515	3,090
Loblia	242	493	2,958
Cherry	299	415	2,490
CROSSES.			
Bessie	266	782	4,692
Dina	318	528	3,168

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 29th August, 1908, ruling at the several centres named, is published for general information.

Centre.	A. Wheat per 100 lbs.	B. Wheat Flour per 100 lbs.	C. Boer Meal per 100 lbs.	D. Mealies per 100 lbs.	E. Mealie Meal per 100 lbs.	F. Barley per 100 lbs.	G. Oats per 100 lbs.	H. Oat-hay per 100 lbs.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Aliwal North ..	0 9 6	0 14 6	0 12 6	0 6 0	0 7 6	0 7 0	0 10 0	0 6 0
Beaufort West ..	0 12 0	1 0 0	0 14 9	0 7 6	0 10 0	0 9 6	0 9 6	0 5 6
Burghersdorp ..	0 10 0	0 16 6	1 7 0	0 7 3	0 17 0	0 7 6	0 15 6	0 6 6
Cape Town ..	..	..	..	..	..	0 7 0	0 6 0	0 3 6
Clanwilliam ..	0 14 0	..	0 14 6	0 8 6	0 10 0	..	0 9 6	..
Colesberg ..	..	..	..	..	..	0 10 1	..	..
Cradock ..	0 11 3	..	0 12 6	0 6 3	..	0 9 0	..	0 6 3
Dordrecht ..	0 9 6	0 15 6	0 14 6	0 8 6	0 9 6	0 8 0	0 9 0	0 5 0
East London ..	..	..	..	..	..	..	..	..
Graaff-Reinet ..	0 10 0	..	..	0 6 6	..	0 7 0	..	0 6 0
Grahamstown ..	0 12 3	..	..	0 7 9	..	0 9 0	0 9 1	0 5 9
Kimberley ..	0 10 [illegible]	0 16 0	0 13 9	0 5 3	0 6 8	0 6 0	0 6 6	0 4 10
King William's Tn. ..	0 10 0	0 17 0	0 14 0	0 6 6	0 7 6	0 10 0	0 5 6	0 4 6
Malmesbury ..	0 10 0	1 8 6	1 4 0	0 15 6	..	0 12 6	0 8 0	0 3 0
Mossel Bay ..	0 14 0	0 14 0	0 15 0	0 7 3	0 8 0	0 5 6	0 7 0	0 4 6
Port Alfred ..	0 12 0	0 18 0	0 17 0	0 8 0	0 12 0	0 10 0	0 10 0	0 5 0
Port Elizabeth ..	0 10 6	..	..	0 7 0	..	0 7 6	0 8 0	0 4 9
Queenstown ..	0 10 0	0 15 6	0 13 0	0 6 3	0 7 9	0 10 0	0 10 0	0 4 9
Tarkastad ..	0 14 0	0 10 6	0 16 0	0 8 0	0 10 0	0 8 0	0 8 6	0 7 6
Vryburg ..	0 15 0	0 17 6	0 16 0	0 8 0	0 9 0	0 11 0	0 11 0	0 3 0
Worcester ..	0 11 0	0 16 6	0 12 3	0 8 0	0 9 0	0 8 0	0 7 0	0 3 6
Johannesburg ..	..	..	1 2 6	0 10 0	..	0 8 6	0 8 6	0 5 3

Centre.	J. Potatoes per 100 lbs.	K. Tobacco (Boer Roll) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		
Aliwal North ..	0 7 6	0 2 0	0 0 7	0 0 6	0 2 6	0 1 0	£9	14/-
Beaufort West ..	0 12 6	0 0 7	*4d.. 10d.	*4½d to 5½d	0 1 9	0 1 3	£9	17/-
Burghersdorp ..	0 7 6	0 0 6	0 0 6	0 0 5	0 1 8	0 0 9	..	..
Cape Town ..	0 18 0	..	..	..	0 1 3	0 1 0	..	..
Clanwilliam ..	0 8 0	0 0 9	0 0 7	0 0 6	0 1 3	0 1 0	..	..
Colesberg ..	[illegible] to 1/6	..	..	..	1/9 to 2/-	9d. to 1/1	..	..
Cradock ..	0 15 0	0 0 9	0 0 5	0 0 5	0 2 3	0 0 10	..	..
Dordrecht ..	0 12 0	0 1 0	0 0 3½	0 0 3	0 1 6	0 0 8	£8	12/6
East London ..	..	..	..	..	..	..	..	..
Graaff-Reinet ..	0 11 0	0 0 2	0 0 5	0 0 5	0 2 0	0 1 0	£11	10/-
Grahamstown ..	0 12 6	0 0 6	0 0 6	0 0 3½	0 2 2½	0 0 9½	..	..
Kimberley ..	0 13 0	0 0 5	0 0 7½	0 0 6	..	0 0 8½	£9	11/9
King William's Tn. ..	0 9 0	0 0 4½	0 0 5	0 0 4½	0 2 0	0 0 10	£12 10s.	20/-
Malmesbury ..	0 18 0	0 2 9	0 0 6	0 0 6	0 1 3	0 1 0	£10	20/-
Mossel Bay ..	0 12 0	0 0 6	0 0 7	0 0 8	0 1 6	0 0 9	..	..
Port Alfred ..	0 11 0	0 0 9	0 0 4	0 0 6	0 1 3	0 0 6	..	..
Port Elizabeth ..	1 1 0	..	0 0 6½	0 0 6½	0 1 9	0 1 2	..	..
Queenstown ..	0 10 0	0 0 7	0 0 5	0 0 5	0 2 3	0 1 0	£12 to £14	18/- to 22/-
Tarkastad ..	0 7 0	0 0 9	*0 0 5	*0 0 5	0 2 0	0 1 6	£10	20/-
Vryburg ..	0 10 0	0 0 8	*5d. to 9d. †5d. to 9d.	*5d. to 6d. †5d. to 6d.	0 1 6	0 1 6	£8 to £13	12/6 to 20/9
Worcester ..	0 10 0	0 0 5	0 0 7	0 0 6	0 1 5	0 0 9	£7 to £12	18/- to 26/-
Johannesburg ..	0 16 6	..	0 0 6	0 0 4½	..	0 1 4	£8 10s. to £13 10s.	14/- to 24/6

NOTE.—A blank space denotes "no transactions." * Colonial. † Frozen.

PRODUCE MARKETS.

PORT ELIZABETH.

Messrs. John Daverin & Co. report under date August 28th :—

Ostrich Feathers.—The Market was again well supplied this week with a fair average assortment. Competition was active for all super qualities, but common and average Whites and Feminas were decidedly lower. Blacks, Drabs and Tails showed no change The total quantity sold on the Public Market realised £11,286 11s. 8d., and weighed 4,837 lbs. 8¼ ozs. Very little business has been done out of hand.

	£	s.	d.		£	s.	d.
Primes : Extra Super			Special Prices.				
Good to Super ...	14	0	0	to	25	0	0
Whites : Firsts ...	10	0	0	,,	14	0	0
Seconds ...	5	0	0	,,	9	0	0
Thirds ...	0	10	0	,,	3	0	0
Feminas : Super ...	9	0	0	,,	15	0	0
Firsts ...	6	10	0	,,	9	0	0
Seconds ...	3	10	0	,,	6	10	0
Thirds ...	0	5	0	,,	2	0	0
Greys ...	1	10	0	,,	6	10	0
Fancy	3	10	0	,,	8	0	0
Tails : White	0	10	0	,,	2	15	0
Light	0	10	0	,,	1	15	0
Coloured & Dark	0	1	0	,,	0	15	0

	£	s.	d.		£	s.	d.
Blacks : Long ...	2	10	0	to	6	10	0
Medium ...	1	0	0	,,	3	0	0
Short ...	0	5	0	,,	1	0	0
Wirey ...	0	0	3	,,	0	0	6
Floss ...	0	5	0	,,	1	15	0
Drabs : Long... ...	1	0	0	,,	3	10	0
Medium ...	0	12	6	,,	1	10	0
Short... ...	0	2	6	,,	0	6	0
Wirey ...	0	0	3	,,	0	0	6
Floss... ...	0	5	0	,,	2	0	0
Spadonas : Light ...	0	5	0	,,	3	0	0
Dark ...	0	2	6	,,	1	10	0
Chicks...	0	0	3	,,	0	1	6

The following may be quoted as the approximate current values of unsorted parcels, per line :—

	Whites.	Feminas.
Superior pluckings	£8 0 0 to £9 0 0	£5 10 0 to £6 10 0
Good Average lots	7 0 0 to 7 10 0	4 0 0 to 5 0 0
Poor Average lots	4 10 0 to 6 0 0	2 10 0 to 3 5 0
Commen lots, stalky, narrow and discoloured	4 0 0 to 5 0 0	1 10 0 to 2 10 0

	Tails.	Blacks.	Drabs.	Spadonas.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
Good ...	15 0 to 20 0	20 0 to 30 0	12 6 to 15 0	20 0 to 30 0
Average ...	10 0 to 12 6	16 0 to 18 0	7 6 to 10 0	5 0 to 15 0
Poor ...	5 0 to 9 0	10 0 to 12 6	5 0 to 7 6	2 6 to 5 0

It will be understood that for Special Lots these quotations may be exceeded.

Wool.—**This Market continues steady, and any new season's grease arriving is readily sold at full current prices. On the Public Market yesterday a limited quantity was offered, prices showing no change.**

The following remarks are taken from *Dalgety's Wool Review*, and refer to the prospects for the coming Australasian clip :—"In speaking of the coming clip it may be well to straight away express wonderment at certain articles which have quite recently appeared in certain London papers, and in London Wool Letters to Australian papers, which refer to the growing clip in Australasia as likely to be one of the largest and best on record. In fact the writers have assured the public that such will be the case. Such writers have been deplorably misinformed, for the growing clip in Australasia will be one of the worst on record; the percentage of thin, burry wool will be very large, and of good warp combings proportionately small. Furthermore, a decrease in actual production seems assured. As we have over 50 branches, and members of our staff are continually travelling in the districts of the various States, we feel that we can at least speak with confidence as regards pastoral affairs and the character of the growing clip. Where the Press writers to whom we have referred got their information puzzels us, as for months past a bad clip, speaking generally, has unfortunately been assured."

Snowwhite, Extra Superior ...	17d	to 17½d
Do. Superior	16d	„ 16½d
Do. Good to Superior...	15d	„ 15½d
Do. Inferior Faulty ...	13d	„ 14d
Grease, Super Long, well-conditioned, Grassveldt grown (special clips) ...	6½d	„ 7d
Do. do. do. ...	5½d	„ 6d
Do. do. Karoo grown (special clips)	5½d	„ 6d
Do. do. do. ...	4¾d	„ 5d
Do. do. Mixed Veldt...	5d	„ 5½d
Do. Light, faultless, medium Grassveldt grown ...	5d	„ 5½d
Do. do. Karoo grown	4½d	„ 5d
Do. do. short, do.	4d	„ 4¼d
Grease, Coarse and Coloured ...	1½d	to 2¾d
Scoured do. do. ...	2d	„ 9½d
Basuto Grease, short	5d	„ 5d
O.R.C. Grassveldt Grease, long & well-conditioned (special clips)	5½d	„ 6d
Do. do. do. ...	4½d	„ 5d
Do. do. medium grown, light, with little fault	4½d	„ 4¾d
Do. do. short, faulty & wasty	3¾d	„ 4d
Do. do. Karoo grown, long & well-conditioned ...	4½d	„ 4¾d
Do. do. medium grown, light with little fault ...	3½d	„ 4d
Do. do. short, faulty and wasty...	3¼d	„ 3¼d

Mohair.—This Market continues very firm, and some sales of Super Firsts have been made at 11d., and Kids at 16d. to 16½d. Stocks are now very low, the season being over. On the Public Market on Tuesday a fairly large quantity was offered, prices ruling firm.

Super Kids	15½d	to 16½d
Ordinary Kids and Stained ...	12d	„ 13d
Superior Firsts, special clips	10½d	„ 11d
Ordinary Firsts...	8½d	„ 9½d
Short Firsts and Stained ...	7d	„ 7d
Superfine Long Blue O.R.C. Hair	8d	„ 8½d
Mixed O.R.C. Hair (average)	6¾d	to 7½d
Do. very mixed ...	6d	„ 6½d
Seconds and Grey	5d	„ 6d
Thirds	4d	„ 4d
Winter Kids, special clips	...none offering	
Do. good ordinary	...none offering	
Winter Hair	...none offering	
Basuto Hair (nominal) ...	7½d	to 8d

Skins.—Sheepskins in bundles, 4¾d.; Pelts, 3¼d.; Capes, 15d.; damaged, 4d. each; Goatskins, 10½d.; damaged, 5d. per lb.; Angoras, 5½d.; Shorn, 3¾d.; damaged, 2¾d. per lb.; Springbok, 8d. each; Johannesburg Goat, 8d.; Angoras, 4d.

Hides.—Sundried, 7d.; damaged, 5¾d.; Salted, 6¼d.; damaged, 4¾d.; Thirds, 3¾d.; Madagascar Hides, 4d.; damaged, 3d.

Horns.—3½d. each all round.

CAPE TOWN.

Mr. R. Müller (Produce Department) reports for the month ending August 31st :—

Ostrich Feathers.—The Market remains practically unchanged. Super quality in all classes is firm with a rising tendency, but ordinary and narrow Feathers remain weak and neglected. Dealers up-country should purchase the latter at reduced prices in order to avoid losses. All good quality dark goods, particularly Blacks are in good request at firm rates.

		£	s.	d.	£	s.	d.
Super Primes	...	15	0	0	35	0	0
First, ordinary Super	to ...	10	0	0	14	0	0
Seconds	...	5	0	0	9	10	0
Thirds...	...	3	0	0	4	0	0
Femina Super	...	10	0	0	15	0	0
Do.. Seconds Firsts	to ...	3	10	0	9	0	0
Byocks (Fancy)	...	5	0	0	9	0	0
Long Blacks ...	...	3	10	0	7	0	0
Medium Blacks	...	1	10	0	3	0	0
Short to Medium	...	0	10	0	1	15	0

		£	s.	d.	£	s.	d.
Floss ...	...	0	5	0	1	15	0
Long Drabs ...	...	2	0	0	3	10	0
Medium Drabs	...	1	0	0	1	10	0
Short to Medium	...	0	5	0	1	0	0
Floss ...	...	0	5	0	1	15	0
White Tails ...	...	1	10	0	2	10	0
Coloured Tails	...	0	5	0	1	5	0
Chicks...	...	0	1	0	0	2	0
Spadonas	...	2	0	0	3	0	0
Inferior Black and Drabs, short to long	...	0	0	6	1	10	0

Wool.—During the past month business has been quiet, as we are still between seasons. For all good Grease Wools of Combing description the Market continues firm, but wasty lots remain neglected, and they can only be sold at low prices. Calvinia Grease, Medium to Long, may be quoted from 5d. to 5¾d.; Short, from 4½d. to 4¾d.; Karoo Combing Grease, from 5¼d. to 6¼d.; Short to Medium, from 4d. to 4¾d.; Malmesbury Grease offered, consisting mostly of common quality, for which prices ranged from 3¾d. to 4¾d., according to condition.

		s.	d.	s.	d.
Super long Grass Veld	...	0	7	0	7½
Do. Karoo	...	0	5½	0	6¾
Medium	...	0	4	0	5
Short and inferior ...	...	0	3½	0	4

		s.	d.	s.	d.
Wool for Washing ...	...	0	4½	0	5½
Snow-white Super to Extra		1	4	1	7
Do. Ordinary	...	1	1	1	4
Fleece Washed	...	0	0	0	8

Mohair.—There has been a better enquiry lately for the best clips, and a fair amount of business has been put through. Mixed parcels, however, have not shared very much in the advance. The lesson which our Goat Farmers have to learn is, to breed for better quality hair, as the trade at Home is not in a temper to put up with coarse quality, when it can obtain the required standard of fineness to a higher degree in Turkey average than what is represented in Cape Firsts.

		s.	d.	s.	d.
Firsts, Summer	...	0	8	0	10½
Kids ...	...	1	0	1	4½
Seconds	...	0	5½	0	6
Winter	...	0	6	0	7½
Do. Kids...	...	0	11	1	0

Hides and Skins.—Our Market is firm for all classes. Light Goatskins have advanced, while heavier are somewhat lower. There is a strong inquiry for Dry Hides. Consignments forwarded will arrive to a good Market.

		s.	d.	s.	d.
Long woolled Skins	...	0	4¼	0	5¼
Short...	...	0	3¼	0	3¾
Shorn	...	0	2¾	0	3
Bastards	...	0	2¾	0	3
Cape Skins, each	...	1	4	1	9
Do., cut, each	...	0	0	1	0

		s.	d.	s.	d.
Goat, heavy to light	...	0	7	0	11
Sundried	...	0	0	0	5
Angoras	...	0	0	0	4
Sundried Hides	...	0	5	0	5½
Salted	...	0	4	0	5
Wet...	...	0	3	0	3½

JOHANNESBURG.

Monthly report from Mr. Alfred Webb, Produce Agent to the Cape Government, P.O. Box 2,342. Telegraphic Address, Co-operato.

Live Stock.—The month's business in slaughtered stock has been characterised by an over-supply of medium class and poor animals, both cattle and sheep, anything prime has consequently fetched high prices. The meat market has advanced ½d. per

lb. in the wholesale trade, and for the next few months this point is likely to be maintained. The warm weather now setting in will adversely affect importations of dressed meat from Natal and the Orange River Colony, and thus prices (for cattle especially) should greatly improve. The turnover for the month approximated 2,500 slaughter bullocks and 35,000 sheep.

Tollies and Heifers.—Low prices for these animals continue, and bargains for farm use can be picked up.

Pigs.—Only very best quality is wanted as prices have fallen ½d. for this class, and 1d. for roughs.

Breeding Stock.—There is no regular demand in Johannesburg for ordinary breeding stock, and much loss and disappointment has resulted through ignorance of this fact on the part of consignors. The demand is for slaughter stock in the best possible condition, and breeding stock should not be consigned before communicating with a reliable agent.

East Coast Fever.—Farmers whose farms adjoin infected areas are advised that cattle contracts can be placed before quarantine regulations overtake their districts.

Vegetable Produce—A brisk demand continues for mealies, onions, potatoes and dry lucerne. Prices for all these articles have steadily advanced, and the market is firm. In the fruit section strawberries are being sold at good figures.

Animal Produce.—Eggs are cheaper for all sorts. Butter is scarce, and much enquired for.

SECOND EGG LAYING COMPETITION.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

RECORD FOR AUGUST, 1908, AND TOTALS TO END OF AUGUST.

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date. Eggs.	Total per Pen to date. Weight ozs.
1	C. H. van Breda	White Leghorns	1	18	$34\frac{11}{16}$		
			2	18	$34\frac{7}{16}$		
			3	21	$36\frac{10}{16}$		
			4	19	39	238	$440\frac{3}{4}$
2	F. Muller ...	Black Minorcas	5	13	$27\frac{12}{16}$		
			8	16	$33\frac{12}{16}$	60	$126\frac{1}{2}$
3	H. Chas. Starke	Buff Orpingtons	9	5	$9\frac{6}{16}$		
			10	23	$48\frac{3}{16}$		
			11	11	21	130	246
4	J. W. Wright ...	White Wyandottes	13	9	$18\frac{8}{16}$		
			14	3	$5\frac{11}{16}$		
			15	12	$27\frac{3}{16}$		
			16	2	$3\frac{10}{16}$	79	$165\frac{5}{8}$
5	C. H. van Breda	White Leghorns	17	21	$40\frac{5}{16}$		
			18	22	$41\frac{14}{16}$		
			19	19	$40\frac{9}{16}$		
			20	14	$27\frac{3}{16}$	267	$515\frac{7}{8}$
6	F. T. Hobbs ...	Silver Wyandottes	22	10	$19\frac{13}{16}$		
			23	1	$1\frac{15}{16}$	66	$121\frac{15}{16}$
7	H. D. Bradley...	Silver Wyandottes	25	17	$35\frac{1}{16}$		
			26	18	$35\frac{1}{16}$		
			27	22	$41\frac{13}{16}$		
			28	18	$33\frac{6}{16}$	124	$236\frac{13}{16}$
8	J. G. Lay ...	White Leghorns	29	23	$45\frac{5}{16}$		
			30	18	$37\frac{8}{16}$		
			31	17	$38\frac{6}{16}$		
			32	23	$44\frac{5}{16}$	172	$346\frac{3}{4}$
9	C. H. van Breda	White Leghorns	33	18	$34\frac{9}{16}$		
			34	22	$43\frac{6}{16}$		
			35	21	$41\frac{1}{16}$		
			36	17	$33\frac{10}{16}$	211	$404\frac{3}{16}$
10	R. Johnston ...	Buff Orpingtons	37	23	$47\frac{6}{16}$		
			38	18	$32\frac{3}{16}$		
			40	14	26	118	$219\frac{1}{2}$

RECORD FOR AUGUST, 1908, AND TOTALS TO END OF AUGUST—*continued.*

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date. Eggs.	Total per Pen to date. Weight ozs.
11	S. Smith ...	Silver Pencilled Wyandottes	41	19	35 4/16		
			42	8	11 13/16		
			43	21	34 14/16	98	163¼
12	(Vacant).		...	...	...	...	...
13	S. Smith ...	Brown Leghorns	49	21	40 7/16		
			50	18	32 14/16		
			51	19	35 5/16		
			52	19	36 13/16	107	202 7/16
14	Clifford Hoole...	Black Minorcas	53	11	22		
			54	21	31 11/16		
			55	19	32 10/16		
			56	13	25 7/16	239	408¼
15	S. Smith ...	White Leghorns	57	7	18 9/16		
			58	22	39 13/16		
			59	17	35 1/16		
			60	20	36 14/16	235	428
16	S. Smith ...	White Leghorns	61	21	36 9/16		
			62	18	35 1/16		
			63	2	3 14/16		
			64	20	36 6/16	229	401 6/16
17	W. R. Allen ...	White Leghorns	65	20	34 5/16		
			66	14	31 6/16		
			67	2	4		
			68	5	10 11/16	113	222 11/16
18	S. Smith ...	White Wyandottes	69	15	28 6/16		
			70	22	39 12/16		
			71	15	32 7/16		
			72	22	43 14/16	150	286 6/16
19	R. W. Hazell ...	Blue Andalusians	73	3	5 11/16		
			74	18	33 13/16		
			75	20	37 12/16		
			76	17	34 11/16	150	284
20	Clifford Hoole...	Brown Leghorns	77	10	18		
			78	22	38 6/16		
			79	18	23		
			80	22	20 11/16	191	238¼
21	R. W. Hazell ...	White Wyandottes	81	7	14 4/16		
			82	5	10 5/16		
			83	12	[illegible]		
			84	27	[illegible]	103	[illegible]
22	S. Smith ...	White la Bresse	85	9	[illegible]		
			87	[illegible]	[illegible]		
			[illegible]	16	[illegible]	[illegible]	263¾
23	R. J. Williams	Black Minorcas	90	[illegible]	29 14/16		
			91	[illegible]	21 7/16		
			[illegible]	[illegible]	6 5/16	[illegible]	[illegible]

FRUIT EXPORT.

Return of Fruit Shipped from Cape Colony during July, 1908.

Port of Shipment.	Destination.	No. of Packages.	Description of Fruit.	Quantities.	Value. £ s. d.
Cape Town ...	England	679	Oranges ...	95,082	184 3 6
" ...	"	209	Naartjes ...	22,000	102 10 6
" ...	"	29	Lemons ...	3,490	7 5 0
" ...	German South West Africa	1	Limes ...	200	0 10 0
" ...	"	1	Figs ...	200	4 1 6
" ...	"	23	Naartjes ...	3,458	9 4 9
" ...	"	16	Pineapples ...	1,406	14 10 0
" ...	"	15	Bananas ..	7,350	15 2 0
" ...	"	11	Lemons ..	2,250	6 10 6
" ...	"	22	Pears ...	2,350	4 15 0
" ...	"	62	Oranges ...	9,425	25 18 0
" ...	"	201	Apples ...	23,050	108 16 6
Port Elizabeth	England	1,729	Oranges ...	83,790	349 6 0
" ...	"	41	Naartjes ...	5,545	31 0 0
" ...	"	123	Pines ...	2,580	15 0 0
" ...	"	3	Shaddocks ...	86	1 11 0
" ...	Germany	196	Oranges ...	5,900	28 0 0

BREEDERS' DIRECTORY & FARMING NOTICES.

WOOLLED PERSIAN SHEEP.

The Hardiest, Thriftiest most prolific and quickest maturing breed of Woolled Sheep in the world. The most profitable breed for poor dry shrub veldt, large size, grand slaughter animals, yielding also a valuable fleece. Orders booked for import only. Stud Rams and Ewes, £15 each on trucks at East London Harbour.

Choice Merino Rams from best Flocks in Australia from £10 each upwards on trucks at East London Harbour.

Moss & Wardrop,

P.O. Box 163. EAST LONDON.

PURCELL, YALLOP & EVERETT, LTD.,

TIMBER MERCHANTS.

SAW, PLANING AND MOULDING MILLS.

Telegraphic Address :— "PERSISTENT," Cape Town.

JOINERY, TIMBER,

P.Y.E.

HARDWARE & CEMENT.

Colonial-made Joinery a speciality.

WRITE FOR ESTIMATES.

P.Y.E. LTD., P.O. BOX 146, CAPE TOWN.

BOOKS FOR FARMERS.

	Price.	Post Free.
*STEPHEN'S BOOK OF THE FARM. Dealing exhaustively with every branch of Agriculture. 5th Edition, revised in 6 Divisions. No. 1 now ready. Each Division	10/6	12/0
Or to be issued in 3 vols., 21/0 each.		
ENCYCLOPÆDIA OF AGRICULTURE. 4 vols. by W. Green & Sons, Edinburgh ..	25/0 each	27/6
CYCLOPÆDIA OF AMERICAN AGRICULTURE. By Prof. L. H. Bailey. 4 vols. ..	25/0	27/6
FARMERS' CYCLOPÆDIA OF AGRICULTURE. A Compendium of Agricultural Science, etc. By E. V. Wilcox	18/0	20/0
FARMERS' AND FRUIT GROWERS' GUIDE. Issued by direction of the New South Wales Government	12/6	13/6
SHEEP AND THEIR DISEASES. By W. A. Rushworth	7/6	8/6
SHEEP DOCTOR. By G. Armatage	10/6	12/0
THE ANGORA GOAT. By S. C. Schreiner	10/6	11/6
CATTLE BREEDS AND MANAGEMENT. By W. A. Housman	4/0	4/9
FEEDING ANIMALS. By E. W. Stewart	10/6	11/3
CATTLE BREEDING. By W. Warfield	10/6	11/3
*FARM LIFE STOCK IN GREAT BRITAIN. Revised Edition. By R. Wallace ..	20/0	22/0
FARM DRAINAGE. By H. F. French	5/0	5/9
IRRIGATION FARMING. By L. M. Wilcox	10/6	11/6
IRRIGATION AND LAND DRAINAGE. By L. B. Cox	6/0	6/9
THE AMERICAN FRUIT CULTURIST. By J. J. Thomas..	15/0	16/6
CALIFORNIAN FRUITS AND HOW TO GROW THEM. By E. Wickson	15/0	16/6
CITRUS FRUITS AND THEIR CULTURE. By H. H. Hume	15/0	16/0
PLUMS AND PLUM CULTURE. By F. A. Waugh	7/6	8/3
SOILING CROPS AND THE SILO. By T. Shaw	7/6	8/3
FORAGE CROPS. Other than Grasses. By T. Shaw	5/0	5/6
THE BOOK OF ALFALFA. By J. D. Coburn	10/6	11/6
ALFALFA. By ———	3/6	4/0
COFFEE: ITS CULTURE AND COMMERCE. By C. G. W. Lock	12/6	13/3
TOBACCO GROWING, CURING, ETC. By C. G. W. Lock	6/0	6/9
TOBACCO LEAF: ITS CULTURE AND CURE. By J. B. Killikrew & Myrick ..	12/6	13/6
A.B.C. OF BEE CULTURE. By A. I. Root	7/6	8/6

* Prospectuses of these works will be sent Post Free on application; complete Catalogues, also, on receipt of postcard.

T. M. MILLER, Adderley Street, CAPE TOWN.
P.O. Box 396.

ORIGINAL "RIETI" WHEAT.

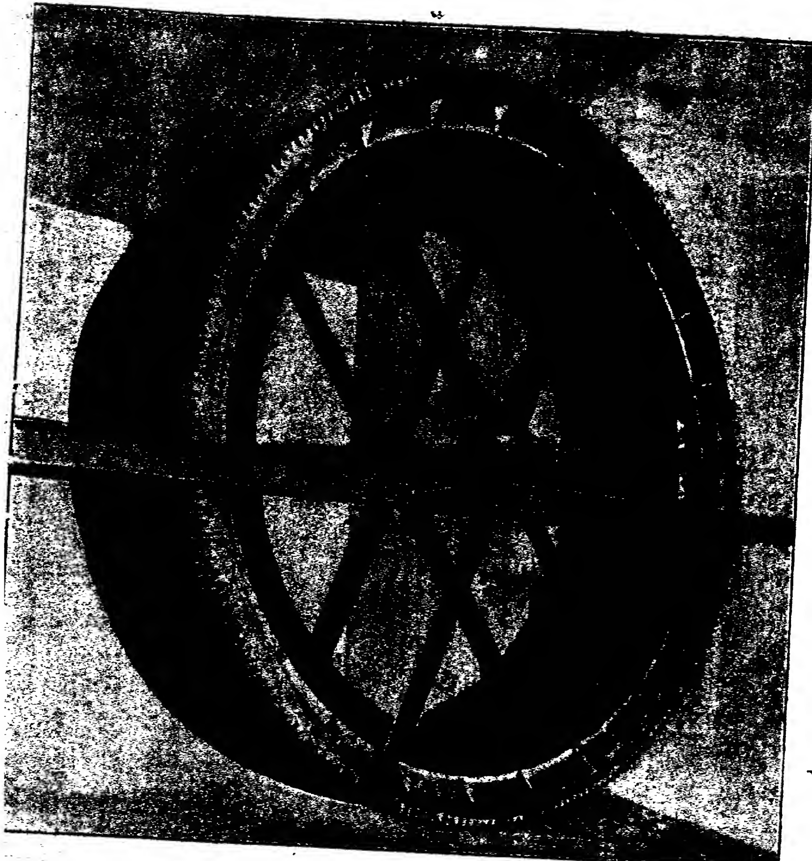
The original Rieti Wheat is the most rust resisting and most productive wheat.

May be obtained from

Unione Produttori Grano da Seme, at Rieti (Italy).

The Union is the only one which can furnish the real "Original Rieti."

Always demand that bags bear the trade mark and name of the Union.



THE

Agricultural Journal

OF THE CAPE OF GOOD HOPE.

No. 4. OCTOBER, 1908. VOL. XXXIII.

Published Monthly in English and Dutch by the Department of Agriculture and distributed gratis to bona fide farmers in the Cape Colony on application through the Resident Magistrate of the District.

SUBSCRIPTION 5s. PER ANNUM. Post Free in South Africa.

Remittances to be made Payable to the Publishers CAPE TIMES, LTD., Church St., Cape Town.

Postal Address:

The Editor "Agricultural Journal," Department of Agriculture, Cape Town.

Telegraphic Address: "Bulletin," Cape Town.

CONTENTS.

B

NOTES.

Correspondence with the Department of Agriculture.

With a view to obviating delay in dealing with official correspondence, letters and telegrams relating to matters falling under the administration of the Secretary for Agriculture should in future be addressed by the general public as under :—

I. To the Under Secretary for Agriculture, Cape Town.

Animal Diseases (other than Scab) : General administration of Acts and Regulations.
Cattle Dipping Tanks : Contributions towards construction.
Cattle Dips : Railage.
Bone-meal : do.
Scab Acts : General administration.
Insect Pests and Plant Diseases : General administration of Acts and Regulations.
Wine, Brandy, Whisky and Spirits Act and Regulations.
Beer and Vinegar Act and Regulations.
Fertilisers, Farm Foods, Seeds and Pest Remedies Act and Regulations.
Fisheries.
Agricultural Shows : Grants.
Brands Act.
Fencing Acts.
Destruction of Wild Carnivora.
Destruction of Locusts.
Guano and Sealing : General administration.
Game.
Parks and Gardens : Grants.
Noxious Weeds.
Appointments and changes of Staff.
Tenders.
Publications.

II. To the respective Heads of Branches.

Subjects.	*Heads of Branches.*	*Telegraphic Addresses.*
1. Animal Diseases and detailed administration of Acts and Regulations relating thereto. Stock and Stock-farming.	Chief Veterinary Surgeon, Cape Town.	Veterinus, Cape Town.
2. Insect Pests and Plant Diseases, and detailed administration of Acts and Regulations relating thereto.	Government Entomologist, Cape Town.	Entomologist, Cape Town.
3. Administration of Agricultural College.	Principal, Elsenberg College, Mulder's Vlei.	Ager, Mulder's Vlei.
4. Cereals, Manures, Management of Experiment Stations, Applications for Seeds for trial, etc.	Government Agriculturist, Cape Town.	Agriculturist, Cape Town.
5. Orchards, Pruning and Fruit-growing in general.	Horticultural Assistant, Cape Town.	—
6. "Agricultural Journal" ...	Editor, "Agricultural Journal," Cape Town.	Bulletin, Cape Town.
7. Dairying	Dairy Expert, Queenstown.	Dairy Expert, Queenstown.
8. Wool-sorting, etc.	Govt. Wool Expert, Cape Town.	Govt. Wool Expert, Cape Town.

Subjects.	Heads of Branches.	Telegraphic Addresses.
9. Bacteriology	Director, Veterinary Laboratory, Grahamstown.	Institute, Grahamstown.
10. Agricultural Co-operation ...	Superintendent, Agricultural Co-operation, Cape Town.	Co-operation, Cape Town.
11. "Groot Constantia," Wine Farm...	Manager, Government Wine Farm, Groot Constantia.	Vitis, Wynberg.
12. Viticulture and Wine-making ...	Director of Agriculture, Cape Town.	Agriculture, Cape Town

With the exception of the detailed administration of Acts and Regulations which are under the general control of the Under Secretary for Agriculture. the above subjects under this head are under the general control of the Director of Agriculture, to whom correspondence of a general nature bearing on these subjects should be addressed.

Subjects.	Heads of Branches.	Telegraphic Addresses.
13. Analyses of Soils, Minerals, etc. ...	Senior Analyst, Cape Town.	Neon, Cape Town.
14. Scab Acts: Detailed administration.	Chief Inspector of Sheep, Cape Town.	Acarus, Cape Town.
15. Guano and Sealing: Detailed administration.	Superintendent, Government Guano Islands, Cape Town.	—

These three subjects are also under the general control of the Under Secretary for Agriculture.

III. (*a*) To the Surveyor-General, Cape Town.

Land Acts and Land matters generally.
Mining Acts and Regulations.

(*b*) To the respective Heads of Branches.

Subjects.	Heads of Branches.	Telegraphic Addresses.
1. Mines, Kimberley, etc.	Inspector of Mines, Kimberley.	Mines, Kimberley.
2. Claims, Barkly West, etc.... ...	Inspector of Claims, Barkly West.	Claims, Barkly West.
3. Geology	Secretary to the Geological Commission, S.A. Museum, Cape Town.	—

These subjects are under the control of the Surveyor-General.

IV. (*a*) To the Chief Conservator of Forests, Cape Town.

General Forest Administration and School of Forestry.

(*b*) To the respective Heads of Branches.

Subjects.	Heads of Branches.	Telegraphic Addresses.
1. Forests, Western Conservancy ...	Assistant Conservator of Forests.	Forests, Cape Town.
2. Forests, Midland Conservancy ...	Conservator of Forests, Knysna.	Forests, Knysna.
3. Forests, Eastern Conservancy ...	Conservator of Forests, King William's Town.	Forests, King William's Town.
4. Forests, Transkeian Conservancy...	Assistant Conservator of Forests, Umtata.	Forests, Umtata.

These Conservancies are under the general control of the Chief Conservator of Forests.

Charges for Testing Cattle for Tuberculosis.

It is notified by the Department of Agriculture that the undermentioned charges will be levied for subjecting cattle to the Tuberculin test,

OUTSIDE THE LIMITS OF THE CAPE TOWN AND SUBURBAN MUNICIPALITIES.

(*a*) *Farmers' Stock*.—One shilling for each animal tested; applicants to provide free transport from and to the nearest Railway Station.
(*b*) *Dealers' Stock*.—Two pounds for eight animals or under, and half-a-crown for each additional animal; applicants to provide free transport from and to the nearest Railway Station.

Within the limits of the Cape Town and Suburban Municipalities no cattle will be tested for Tuberculosis by Government Veterinary Surgeons, except in-contact cattle in the case of actual outbreaks of the disease and animals imported from oversea on arrival at the Port of Cape Town.

All charges must be paid in to the nearest Civil Commissioner or Resident Magistrate before a certificate of freedom from Tuberculosis will be granted.

Mozambique Plant and Fruit Regulations.

The Government of the district of Lourenco Marques has proclaimed regulations regarding the introduction of trees, plants, fruit, bulbs, roots, seeds, etc., somewhat similar to those now in force in the Transvaal. These regulations came into force on September 1st. Trees and plants may be introduced only under a special permit issued by the "Chief of Entomological Section, Department of Agriculture," Lourenco Marques, and any Cape Colony nurseryman who is likely to receive any order for plants from any part of the Province of Mozambique is advised to apply to the Government Entomologist, Cape Town, to have a copy of the last report on his premises submitted to this official for the latter's guidance. It may not be safe to fill any order without an assurance from the would-be purchaser that a special permit for the particular introduction has been issued. Except under special circumstances, a party is not to be allowed to introduce more than ten plants or one hundred cuttings of any variety in any one year.

Apples, pears, and quinces are to be destroyed if over 5 per cent. of the fruits show the work of the Codling Moth larvæ. Peaches, plums, apricots, and other stone-fruits are to be destroyed if over 5 per cent. show the work of Fruit Fly maggots. Oranges, lemons, naartjes, and other citrus fruits are to be destroyed if 5 per cent. show the presence of larvæ of the so-called Natal Codling Moth; and if more than 25 per cent of these fruits show the presence of any scale insects they are to be cleansed or destroyed as the inspector may decide.

Tick Parasite.

The United States Department of Agriculture this year has an appropriation of £50,000 for work against the tick pest in Texas and other Southern States. All sides of the problem are being studied. A few months ago it was mentioned in this publication that the experts had

discovered a tick parasite in the course of their work, and would endeavour to send a colony of this beneficial creature to South Africa. Since then a second species, one attacking a kind of tick closely allied to the "brown ticks" (*Riphicephalus*) of the Cape has been discovered. Several hundred specimens of supposedly infested ticks were collected last month and despatched to the Government Entomologist, Cape Town, and an advice of the sending was cabled. The material has duly arrived. It had been divided into three lots. One came direct by post in moist packing, another in moist packing in the cool chamber of the Cape steamer, and the third in dry packing in the same box. The specimens in lots 1 and 2 were all dead on arrival, and many in the 3rd lot, unfortunately the smallest of the three, appear to be alive. They are receiving the best of attention, and if any parasites emerge, an abundance of ticks in various stages of development will be awaiting their attack.

Fig Fertilising Insect.

The little colony of *Blastophaga grossorum* at Elsenberg has survived the winter in better condition than those in charge of it had dared to hope for, and success in establishing the insect during the coming summer in the plots of caprifigs growing at Constantia and Wellington is now confidently anticipated. Adult females began to emerge on or shortly before September 24th, and numbers have come out every fine day since. On October 2nd a few of the figs from which the tiny wasps were seen to be coming were taken to Wellington and placed in a suitable caprifig tree there, and on the following day a few were similarly placed at Constantia. The fruits on the No. 1 and No. 2 caprifig trees are too far advanced for the insects, but that on No. 1 is at just the right stage.

Codling Moth Parasite.

It will come as a disappointment to many fruit growers in the Cape Colony to learn that the Spanish Codling Moth parasite (*Calliephialtes messer*) is now acknowledged a practical failure in California by the State Horticultural Commissioner. A recent report by the New South Wales Government Entomologist states also that its value in Spain has been greatly exaggerated, apples in the districts where it was found being very badly infested with the pest. This official got his information officially in Spain when on a personal visit early this year. The colony of the parasite brought to the Cape by Mr. C. W. Mally, the Eastern Province Entomologist, in January last, however, is doing very well in the confinement of breeding cages; and it is expected that many hundreds of fertilised females will be ready for liberation in infested orchards in about three months. The Entomologist will specially select the places to liberate colonies in order to ensure that the chances for survival are of the best, and does not anticipate being able to comply with requests for colonies. It is said that the failure of the parasite in California is due to the scarcity of Codling Moth larvæ in the orchards, most being taken to the packing houses and there escaping when the fruit is plucked. There is an abundance of larvæ under the bark in many Cape orchards and gardens, so the parasite may prove more useful here than in California, but the Entomologist is not sanguine on the matter. His advice is to spray with arsenate of lead with the most powerful spray pump that can be afforded. The first spraying should not be applied until the blossoms are off, or until most of them are off if a tree blossoms unevenly. To spray when the tree is in bloom means destruction to many bees and an utter waste of material.

Condensed Milk Factory.

Mr. E. O. Challis, the Government Dairy Expert, writes: Considering the enormous supplies of condensed milk which are still being imported into South Africa, I think the idea of starting a condensing factory in the Cape Colony a sound one. It must, however, be borne in mind that the South African markets are at present in the hands of some of the best and most up-to-date milk factories in the world, therefore the Colonial article must come up to the same standard of excellence if it is to hold its own in open competition with the various brands of condensed milk imported from oversea. To begin with, great care must be exercised in selecting the centre where the factory is to be built, and no local influence should be taken any notice of, if the centre selected is not a suitable one. The main point to be observed is to select a centre where the greatest quantity of milk can be obtained from the smallest radius possible, as it is of such vital importance that milk should arrive at the condensing factory in a sound, sweet and clean condition, therefore the area from which milk supplies can be drawn must to a certain extent be limited. In view of the fact that all milk sent to the factory has to be subjected to a heating process at high temperatures, I should advise entering into an agreement with milk suppliers that should their milk on arrival at the factory be found to contain more than 2 per cent. of lactic acid, it should either be rejected, or separated and the cream returned, as milk which contains ·25 per cent. or over of lactic acid cannot be heated. Considering that milk containing ·25 to ·30 per cent. of lactic acid cannot be detected by either taste or smell, it is important that some test should be applied which would easily determine the amount of lactic acid present, and I should advise either the determination of acidity by titration with deci-normal caustic soda solution, or else by means of Farrington's Alkaline Tablet Test.

Buildings and Plant Required.—The buildings required for a condensed milk factory need not be on an elaborate scale, as temperature of same does not matter to any appreciable extent. On the other hand, the sanitation in the shape of good floors and drainage must be of the highest order. In regard to plant I am of opinion that the most up-to-date plant procurable should be obtained if good work is to be guaranteed. I give the following list of utensils required, these being of the latest pattern: Plant to deal with 400 gallons of milk per day of about 10 hours working. The Patent Vacuum Plant consists of the following utensils: Sugar Melting Pan, Vacuum Evaporator, Condenser and Vacuum Pump, with all accessories. Details as under.

Sugar Pan.—100 gallon capacity Sugar Pan of hemispherical design, measuring internally 4 feet diameter by 2 feet in depth. This pan is constructed of hard-beaten copper, and is provided with cast iron steam jacket with fittings. It is also fitted with bottom discharge cock, air cock, steam valve, safety valve, condensed water cock, etc. *Vacuum Evaporator.*—One Patent Evaporator in cast iron and steel. Internal diameter 3 ft. 9 ins, external diameter about 4 ft. 3 ins. This Evaporator is fitted with one patent rapid circulation principle heating system containing 104 vertical tubes of 2 ins. and 4 ins. diameter. The pan is complete with following fittings: Manhole and cover, swinging hinge bottom for easy cleaning, discharge cock, sampling valve, steam stop valve, air cock, condensed water cock, feed valve, thermometer, and patent anti-priming valve. *Vapour Pipes.*—These are in cast iron of 6 ins. internal diameter with faced flange joints. These connect with the condenser, either of the Jet or Torricelli form. *Condenser: Torricelli form.*—This condenser

is complete with perforated plates, water up-take and down pipe, tank and belt driven 2-in. centrifugal pump. This condenser is self-discharging, and is connected from the top with the vacuum pump. *Condenser—Alternative Jet Type.*—Alternative to the above condenser a jet condenser with spray condensation can be supplied, the water in this case being removed by the vacuum pump, a special catch vessel being employed to act as a final safeguard against boiling over. *Vacuum Pump.*—This is a horizontal wet displacement pump arranged with fast and loose pulleys for belt drive. Supplied with air cylinder, double acting 10 in. diameter by 6 in. stroke.

Estimated Cost.—The 400 gallon size plant as per above specification would cost delivered at Cape Town complete, but not including erection, foundations or other extras required, the sum of £475. The same plant with a capacity of 800 gallons per day as per above specification and conditions would cost approximately £600. In case of the alternative Jet type condenser, the price would be £12 less for the four hundred gallon plant and £14 less for the eight hundred gallon size. Plants quoted for are the same type as those erected in all the latest condensed milk factories. Complete plans and blue prints showing plant fully erected, as well as full particulars regarding working of plant will be supplied by the manufacturers, but only in the event of the order being placed with them.

Plasmopara Viticola or Vine Mildew.—Important Notice

The following important notice to Nurserymen, Fruit Growers and others *re* spraying of vines in the infected area has been issued:—The attention of owners of nurseries, fruit growers and others interested is drawn to the provisions contained in Proclamation 150 of 1908 dealing with the spraying of grape vines, Virginian creepers and other plants of the family *Vitaceæ* for the prevention of the spread of the disease known as *Plasmopara Viticola* or Vine Mildew. It prohibits the introduction *into* the districts of George, Mossel Bay, Oudtshoorn, Prince Albert, Ladismith, Riversdale, Swellendam, Calvinia, Van Rhynsdorp, Bredasdorp, Worcester, Robertson, Caledon, Ceres, Tulbagh, Paarl, Stellenbosch, Clanwilliam, Piquetberg, Malmesbury, and Cape of any grape vine, Virginian creeper, or other plant of the family *Vitaceæ*, or any portion or fruit thereof, *from* the districts of Aberdeen, Albany, Alexandria, Bathurst, Bedford, Cathcart, Cradock, East London, Fort Beaufort, Graaff-Reinet, Glen Grey, Humansdorp, Jansenville, King William's Town, Komgha, Middelburg, Port Elizabeth, Peddie, Queenstown, Somerset East, Stockenstrom, Stutterheim, Tarka, Uitenhage, and Victoria East, which have been proclaimed an *Infected Area* under Government Notice No. 121 of 1908, and provides that no tree, plant, fruit, vegetable, tuber, root or bulb from the infected area shall be introduced into any of the districts first named unless the following precautions have been taken on the farm or property where these articles were produced or where they were packed, viz.:—

(*a*) That every grape vine, Virginian creeper, and other plant of the family *Vitaceae*, not being a native wild plant, growing on said farm or other premises is each year thoroughly sprayed with freshly prepared Bordeaux mixture at least once between October 10th and November 1st, once between November 1st and December 15th, and once between December 15th and January 15th, or else at such other times with such other preparation as may be specially designated by the Secretary for Agriculture.

(*b*) That all fallen leaves and worthless fruit from any plant affected by the disease, are gathered and burned.

(*c*) That no soil, leaves or other substance, gathered on any property where the measures prescribed in (*a*) and (*b*) are not carried out, is used as packing material or otherwise is included with the article.

It must be borne in mind that hitherto the provision in regard to the spraying of vines, etc., with Bordeaux mixture has not been required in terms of this Proclamation, but that from the 10th *October*, 1908, this provision becomes imperative, and no produce from the infected area, as enumerated above, will be accepted by the Railway Department for conveyance to the first-named districts unless accompanied by a Certificate —in the event of the existence of grape vines, Virginian creepers or other plant of the family *Vitaceæ* on the property where such produce was grown or packed—declaring that the necessary precautions as required under Section 3 (as stated under (*a*), (*b*) and (*c*)) have been complied with. When consigning produce which was grown or packed on a farm or property where *no* grape vine, Virginian creeper or other plant of the vine family, not being a native wild plant, exists, a certificate to this effect is necessary. These precautions, however, are not required in the cases of seed, grain, dry forage, cut timber and similar forest products, and no certificates under these Regulations are required when consigning such by rail.

African Coast Fever.

By recent proclamations, owing to the existence of African Coast Fever in the Transvaal, the introduction from that State into this Colony of Green Hides, Skins and Horns, and of Grass-hay and Reeds is absolutely prohibited; and any Green Hides, Skins and Horns, Grass-hay or Reeds so introduced, notwithstanding such prohibition, will be confiscated and destroyed. The introduction from the Transvaal into this Colony of Dry Hides, Skins and Horns, Wool and Mohair shall be subject to the Regulations set forth in the following Schedule:—

1. The introduction from the Transvaal into this Colony of Dry Hides, Skins, Horns, Wool and Mohair, shall be permitted, provided the following conditions be observed, viz.:—

(*a*) Dry Hides, Skins and Horns must be accompanied by a certificate to the effect that they have been properly cured and dressed.

(*b*) The aforesaid certificate must be issued under the hand of the Principal Veterinary Surgeon of the Transvaal, or his duly authorised Deputy, and, if in order, must be countersigned by the Officer of the Cape Mounted Police, to whom it must be produced, stationed at the gate of the Cape Colony-Transvaal Border, through which the said animal produce is to be introduced.

(*c*) Any Dry Hides, Skins or Horns so introduced without being accompanied by the certificate aforesaid shall be dealt with as the Secretary for Agriculture may direct.

2. Wool and Mohair must be properly baled and consigned, either by rail direct to a port for shipment oversea, or by road to any railway station between Mafeking and Fourteen Streams, both included, provided the bales shall not be opened at such station or anywhere *en route* to the port.

The same absolute prohibition applies to Rhodesia as regards Green Hides, Skins and Horns, Grass-hay, and Reeds. The introduction from Rhodesia into this Colony of Dry Hides, Skins and Horns is permitted, provided they are accompanied by a certificate issued under the hand of the Principal Veterinary Surgeon of Rhodesia, or his duly authorised deputy, to the effect that they have been properly cured and dressed. Any Dry Hides, Skins or Horns so introduced without being accompanied by the certificate aforesaid shall be dealt with as the Secretary for Agriculture may direct. The penalty for contravention of the above regulations is a fine of £25.

FARM AND VELD.

Port Jackson Willows

Mr. J. D. Beneke, of Ruiterbosch, Mossel Bay, again writing on the Port Jackson willow, says that in reply to many enquiries he wishes people to know that the seed, before planting, should have boiling water poured on it. After cooling down, it may be planted. Start planting at the commencement of the late rains, not in seed beds, slightly covered by the soil and a little pressed down; not in places that are too wet. 1 lb. of seed, planted at a distance of one yard, will suffice for 500 yards. It makes a first-class pole if cut when the seed is ripe. Those desiring seed may order in November, when it starts ripening. It is to be had from him at 2s. per lb., post free, and he will send it to those remitting the money and send him a written address and order, if possible in Dutch.

A New Worm in the Ostrich.

Mr. W. Robertson, M.R.C.V.S., Director of the Veterinary Laboratory, Grahamstown, writes:—

The worm—of which a photograph appears herewith—has recently been met with in at least three districts of the Colony. I first observed it about a year ago in a bird which died as the result of an accident. Their situation is somewhat curious in that they occur *outside* the abdominal

viscera or guts, being between the guts, generally the outside wall of the stomach and the backbone, where they are found embedded in a piece of loose membraneous material.

The worm is of great length. I have dissected out complete specimens nearly 3 feet 6 inches in length. In all the cases where it has been found, it would appear not to have produced harmful results. In the three *post-mortems* in which I discovered its presence, parasites were the last thing I was looking for. In all three cases, the birds in question succumbed to injuries.

I submitted specimens of the worm to Mr. Shipley, Cambridge, the recognised authority on the subject, who replied as follows:—"Dear Dr. Robertson,—With reference to those long worms you sent me out of the ostrich, which appear to be a species of *Dicheilonema*, it would be very interesting to know whether any lesions have been noticed on the ostrich, especially about the feet. The development of the animal is probably direct. It probably lays its eggs upon the ground or upon water, pretty much like the human Guinea-worm. On the other hand, it might live only on the intestine, perforating that and laying its eggs in the lumen, in which case one would have to examine the dejecta to see if there are eggs in it. If these facts could be found out, one might be able to suggest some prophylactic active measures, but one would also want to know the conditions under which the birds are kept.—Yours, etc. (Signed) A. E. SHIPLEY."

I would take it as a great favour if any ostrich breeder who comes in contact with this parasite would send me a few specimens preserved in weak carbolic and water, say a teaspoonful to a quart, as the matter is one of great interest and importance. The specimens can be sent by rail, carriage forward.

Taint in Hams and Bacon.

Mr. Loudon M. Douglas writes:—I regret that in an article which I sent you on this subject, a slight error has occurred in stating the quantity to which the pumping pickle should be made up as 10 gallons. I hasten to correct this, and to say that this should have been 20 gallons. The recipe should, therefore, read thus: Recipe for Antiseptic Mixture for Pumping Hams and Bacon: 55 lbs. salt, 5 lbs. saltpetre, 5 lbs. dry antiseptic (boric acid prepared as a preservative). This mixture should be made up to *twenty gallons* with water, boiled and stirred till clear, then allowed to cool to the same temperature as the cellar. I may add that the solution should test about 100 degrees on Douglas's Salinometer.

St. Helena and South African Fruit.

The Department of Agriculture is officially informed that the Ordinance of 1904 prohibiting the importation of fruit from South Africa into St. Helena was repealed on the 4th June, 1908, and that consequently from that date any persons may import fruit from South Africa into the Island without being liable to any penalty therefor.

The Stewart Sheep Shearer.

Those farmers who have met with disappointment in using the "Stewart" Sheep Shearer will read the following from Mr. L. Francis, of Stewart's Post, Molteno, with interest. Mr. Francis writes:—I would

like to record my "Stewart" sheep shearing experiences also. The old style shears I saw tried a year or so ago were an utter failure, seeming to drag off the wool and not cut; I quite understand those who tried them noting them useless. Some months ago I obtained a "Stewart" hand-shearing machine from Messrs. Alexander with the 1908 shear, on trial; and after trying it fully, found it did first-class work, cutting like a razor, so I kept the machine and just lately have shorn sheep in 4½ and 5 minutes with it with cutters ground by myself. As a farmer, my advice to those who have tried the hand machines made by the Chicago Flexible Shaft Co., send and get the 1908 shear to use on them, and you will be satisfied with the work done. I lent my shear to a neighbour, who tried it on his machine (bought five years ago) and the first sheep he shore in ten minutes. If I can assist any farmer by letter as to grinding combs and cutters or working hand machine, I shall be pleased.

The Classification of Merino Sheep.

Mr. T. W. King, of Kingsvale, Bedford, writes:—I read with much pleasure in your issue of September, a letter from the pen of Mr. C. C. Vermaak commenting on the suggestion of the Agricultural Union for the classification of sheep at shows. I congratulate Mr. Vermaak on the very able manner in which he has taken up the subject. He is thoroughly unbiassed, and has explained his opinions in a clear, lucid, practical, common-sense manner, and there is no controverting his arguments. I am thoroughly in accord with all he writes. I don't think any of the leading breeders and sheepmen in this country ever thought that the classification as suggested by the Committee of the Agricultural Union would ever be accepted by the Agricultural Societies. This is clearly proved by the fact that most if not all have been calling meetings of those interested to discuss the question. As there is to be a meeting of the members of the Port Elizabeth Agricultural Society on the 15th of October, and I find I cannot attend, I have sent the following suggestion, which I think will meet with the approval of those who are discontented with the present classification—of robust and fine-woolled types.

In my opinion, the object of an Agricultural Society is to encourage the breeding of that class of sheep which is best suited to the differing climatic and pastoral conditions existing in this country, and to encourage the South African farmer in his efforts to improve and grade up and fix the South African type of sheep. It has been proved over and over again at the shows that we have South African bred sheep which hold their own competing with the imported, and the gentlemen who had the —I was going to say audacity—but no, it wasn't anything as good as that—to say that the Cape breeder was "producing animals of no fixed type at all, but merely a show sheep," could not have travelled very far from their "own little cottage home," or had any opportunity of reading any modern literature on the subject of sheep breeding. Take their first suggestion: Australian and Tasmanian type. If these gentlemen had studied the history of the breeding of these types, they would find that they were advocating what they profess to guard against, for most, if not all, of those types have been formed by crossing the different types of Tasmanian, Rambouillet, Vermont, and Saxon merino; the bed rock of these after all being the pure Spanish merino.

A NATURAL CLASSIFICATION.—In order to meet the varied climatic and pastoral conditions obtaining in this country, I would suggest that the classification of sheep at shows should be as follows, viz.:—

1. "*High Veld.*"—Sheep bred, or grazed not less than 6 months previous to the show, in the districts situated at an altitude of not less than 3,000 feet above the sea level.

2. "*Middle Veld.*"—Districts below 3,000 feet of sea level, and not distinctly Karroo.

3. "*Karroo Veld.*"—The first-class, high veld, would embrace the districts of Cathcart, Queenstown, Tarkastad, Dordrecht, Aliwal, Barkly East, Burghersdorp, and Steynsburg. The second class, middle veld, would take in Komgha, Stutterheim, King William's Town, Alice, Fort Beaufort, Bedford, Somerset East, Albany, and Colesberg. The third, Karroo veld, embraces Richmond, Hanover, Middelburg, Graaff-Reinet, Aberdeen, Beaufort West, Victoria West, Willowmore, Oudtshoorn, etc.

Up to the present it will be seen that the sheep breeders in the High Veld have had a distinct advantage in the climatic (cool) conditions, and pastoral conditions, in the breeding and get-up of their sheep for shows. Their success has led them to spend large amounts of money in introducing valuable stud animals to further improve their flocks, which is proved by the fact that most of the prizes of late years have been awarded to sheep from those flocks. In the other classes, "Middle" and "Karroo," the breeders of sheep suited to those localities, such as the Saxon merino, Rambouillet, Tasmanian, and the crosses of the different types will come in for a share of the prizes, with the result that these breeders will be stimulated to make further efforts to improve and grade up their flocks, as the High Veld farmers have done.

The object in awarding the prize would be to give it to the best stud animal, paying special attention to constitution, general appearance, well proportioned—having a fleece of wool which, according to money value, taking quality and weight together—would bring in the best return. And at the same time a sheep that would produce good slaughter stock. It has often appeared to me that of late years some of the judges in making their awards have been too much influenced by the "get-up," or, as they term it, the "show form" of the sheep. Often a superior animal has been passed over for the simple reason that it was not in show condition. It should not be so. With regard to the open class—or unhoused section—I think it should be distinctly stated that there shall be no housing, blanketing, or artificial feeding of any description, and none but natural grass and Karroo-fed sheep allowed to compete. If this rule is strictly enforced, we will find out which sheep are best adapted to the *natural conditions* of this Colony.

Healthiness and Hardiness of Poultry Breeding Stock.

"Colonist" writes:—As the breeding season for poultry is now in full swing, it will do good if the attention of all breeders is called to the absolute necessity of breeding only from birds that are perfectly sound in health and that are full of vigour. Birds that have been shut up and prepared for the various shows are in many cases quite useless, and it is not advisable to purchase the tip-top show specimens if it is intended to commence breeding from them straight away.

Breeding stock should be kept as active as possible all day long, and on no account should they be overfed or fed on too fattening foods. Many of the unsatisfactory hatches and weakly chicks are caused simply through the want of a little reasonable thought and care in the mating and management of the parent birds. It is strange to find how many people there are that will spend money and waste many valuable hours in endeavouring to cure sickly chicks of various ages, while if the same money and time had been devoted in the first instance to the adult birds, the result would have given much pleasure and profit. The same thing happens year after year, and there seem comparatively few who will try and find out where their mistake is. They mostly condemn the unfortunate cock bird and buy another, and so long as it is supposed to be of a different strain they think they have done all that is necessary.

I trust my readers will spend a little thought on the subject, and it will often repay better than an investment of money.

If you want to buy stock, think out what you want, and buy accordingly. Don't always buy what the seller wants you to buy, unless it meets with your requirements, and have nothing to do with birds that show any sign of sickness whatever. Then, having made up your breeding pen, don't pamper the birds at all, but give them good food, and make them scratch as much as possible by burying grain. Supply plenty of green stuff and animal matter of some description, either green bone, cooked offal, grubs, or other animal life. Vary the feed as much as you can, and thus make their lives happy; in fact, do everything possible to promote health and vigour, and the result in eggs and strong healthy chicks will pay you well.

Bert Bowker's Worm Cure.

A number of prominent farmers have written recently recounting the successful use of the above preparation for worms in sheep. Among them is Mr. B. J. Niland, of Adelaide, Mr. C. W. Webber, of Bedford, Mr. E. White, of Palmiet, and Mr. F. C. G. Palmer, of Palmerston, near Graham's Town. As each practically writes in the same strain, no good purpose could be served by publishing their letters. It is gratifying to know that the preparation is effective, and it is to be hoped that further experiments will show that its effectiveness will be maintained.

Tussock Grass or Tall Fescue (Festuca Eliator).

As a great deal of attention is now being directed to the above grass, known to some as Southey's grass, from the fact that Mr. W. R. Southey, of Varkenskop, has grown and recommended it for some years past, the following details from the annual report of Mr. Conrad Appel, seedsman, of Darmstadt, should be of interest. Referring to the seed crop of 1908, Mr. Appel says:—The guaranteed true Rhenish product, which is only grown in a small district of this neighbourhood, yielded much less than last year. Consequently a higher price had to be quoted for the rough seed, therefore the recleaned qualities, specially the superior grades, will demand higher figures. The new crop produced a seed of first class quality,

and I can only advise everybody, who knows the advantage specially of this true Rhenish product, to commence buying in their stock now. Some parties try to use *Festuca pratensis* as an equivalent for this sort, because in former normal years the latter reached double the figure, which had to be paid for the other kind; but *Festuca pratensis* cannot at all replace the true Rhenish Tall Fescue, the latter having a much higher value for farming purposes.

Wood Stave Pipes for Irrigation.

Our attention has been called to the new departure made by Messrs. W. and G. Scott, Ltd., the well-known timber merchants of Salt River, in the introduction of the wood stave pipe for irrigation purposes. It is well known that wooden pipes bored out of the log have been largely used in other countries for water-carrying, and have proved most satisfactory. The stave pipe is an advance on this, and can be constructed to size as required. Their durability is undoubted, as wood lasts well in the ground, in fact even better than metal for some purposes. The stave pipe is wire-bound, and both wire and wood are thoroughly well protected by a coating of a resistent material. In America these stave pipes have played a very important part and are very highly esteemed. They are cheap, strong, light and durable, and thus recommend themselves for a trial in this country. Mr. Heinrich S. du Toit, of Du Toit Bros., the water-boring engineers, of Paarl, writing to Messrs. W. and G. Scott, says he had examined some of these pipes and was perfectly satisfied that they were just as neat and strong as any he had seen in other countries, and is confident when the farmers have seen them used they will buy no others. He has had considerable experience in the use of stave pipes in America, where they are extensively used, he says, in the arid and semi-arid regions. We understand that several farmers interested in irrigation works are giving these stave pipes a trial. They are being manufactured at the Works at Salt River.

Weed's Spraying for Profit.

Messrs. George Findlay and Co., of Cape Town, request us to announce that they will forward, free of charge, a copy of the above to any reader of the *Agricultural Journal* applying for same and mentioning this publication. It is a very handy little work, and should be in the hands of all interested in spraying trees and crops for fungoid and insect pests.

Vinifera x American Hybrid Stocks.

Mr. T. L. Watermeyer, Manager of the Government Wine Farm, Groot Constantia, writes:—Of the numerous Vinifera × American Hybrids, created in France, there have been imported into this country amongst others the following varieties: Mourvedre × Rupestris, Synonyms, Mataro × Rup., Colombeau × Rup., or better known as Hybrid No. 1202. Riparia × Rupestris No. 3306, Riparia × Rupestris No. 3309, Riparia × Rupestris No. 101—14 (Couderc), and Riparia × Rupestris No. 44—01 (Gamay). Experiments with these have mainly been with a view of obtaining a suitable stock for Muscats, particularly Hanepoot, though Jacquez as a bearer of this scion is still playing an excellent rôle. Hybrid No. 1202 created by Couderc, attracted cultural interest in France on account of its extremely vigorous growth in poor soils and in limy soils. Its resistance

to Phylloxera in France could not be fixed, but we note that in California the "1202" grows well in all soils, from chalky land to a deep alluvial one. It has been found quite resistant to Phylloxera, and particularly well adapted to heavy clay soils. In the Jerez district (Spain) we are told it is the stock perhaps more extensively used than any other stock about there, and it is of more interest to note that in the Malaga district it is looked upon as one of the most promising stocks for Gordo Blanco, which latter, if it is not identical with our Hanepoot, the relationship is so close that the difference is hardly distinguishable.

In Constantia, where it was introduced some years ago, it grows with great vigour in stiff clay and in loamy red soils on dry situations, and it imparts this vigour to Hanepoot scions. The only fear at present entertained is that this extreme vigour may result in poor cropping, but if no rectification could be brought about by pruning during the coming season, it will, however, reveal its properties as a bearer. These hybrids were distributed amongst farmers two years ago, and in every case reports coming to hand dwelt upon the good growth made by "1202," and by "3309," "3306," "101—14," "44—01."

During the last season "1202" did not behave satisfactorily in certain nurseries in Constantia. During the growing season the Hanepoot grafted on it grew most vigorously, and in one case it was found necessary to top off a considerable quantity of its growth, but finally when taking them up in the nursery, it was found that the "1202" had not ripened its scion sufficiently, which appeared to be dying back. The nurseries visited were in low-lying situations and somewhat moist, dark soils. The fibrous roots of the "1202" were found to be rotten, while the principle ramifications were dotted with nodules caused by gall worms. Hybrids "3309" and "3306" were also similarly affected, but not to the same extent. The fibrous roots of the latter were, however, intact, but it is well known, that some varieties of vines take this infection to a greater degree than others. On the contrary, stocks grafted and growing on drier situations were found to do well, and only slightly infected by this Nematode. The cause of failure in these particular nurseries inclines to the view that Hybrid "1202" is not suited to moist soils, whilst Hybrids "3309," "3306," "101—14" appear to withstand damp situations somewhat better. The affinity between Hanepoot and the latter named hybrids does not appear so good as it does with "1202."

SOUTH AFRICAN BEE-KEEPING.

By H. L. Attridge, F.R. Met. Soc.

(Lecturer at the late Agricultural Schools at Stellenbosch and Somerset East and Apicultural Adviser to the Department of Agriculture.)

(Continued from page 317.)

CHAPTER XXIII.

Re-Queening.

From what has been previously stated in this direction, the importance of keeping only young queens will be recognised. In a large apiary this is not difficult, but where only a few hives are run, the owner may not have many opportunities for effecting the change; and working nucleus hives profitably with a limited stock is almost out of the question.

A very easy method for re-queening a few hives may be practised as follows: Keep a good look-out for any stock preparing to swarm, especially keeping one hive under observation containing bees with good working qualities, and a prolific queen. This should be the first to swarm. After the swarm has left, examine the hive and notice if sufficient queen cells have been raised to share amongst the stocks it is proposed to re-queen, including one cell to be retained by the parent stock.

Next remove all the undesirable queens. After two days again visit the hive that swarmed, carefully cutting out the number of queen cells required, taking those which are the largest and most perfect in shape. These can now be transferred to the queenless hives. In removing, care must be taken to leave sufficient comb attached for fixing in new position. The cells can be lowered between the centre brood combs and suspended by a hairpin or piece of wire thrust through the comb just above the queen cell; this support will lie at right angles on top of the frames. Be careful not to injure the cells by pressure, keep them the right way up, and it is almost needless to say this operation should be performed on a warm day, and the cells must not be exposed to the direct rays of the sun for any length of time.

In using American frames with thick top bars, the frames must be opened out to allow the queen cells to be passed through in a cell protector, or should be pinned direct on to the comb, cutting out a small piece of comb to allow of this method of fixing. In a few days the young queens will hatch out, and an examination of the hives in about twelve days will generally reveal that the queens have mated and settled down to their maternal duties. Should any doubts be held as to the success of the attempt an earlier examination may be made.

To those having the time and requisite facilities for running nucleus hives, we shall describe later how queens may be reared from selected stock, mated, and introduced where wanted. Of course, where circumstances warrant it, it is desirable to have a few nucleus colonies on hand ready for any emergency.

A good use may be made of a desirable stock that has recently swarmed by breaking it up into nuclei, as follows: About a week after the swarm has departed, the parent stock can be divided into small colonies of two or three frames each, each portion being supplied with one or two queen cells and some brood and honey. The nucleus hives can be placed in any part of the apiary, but the parent hive must remain on the original stand.

The division being made when the hive is queenless, the bees are far more inclined to remain with the hatching brood and queen cells than when nucleis are made up in other ways.

Although a few bees may return to the old stand, the hive remaining there need not be supplied with more than two frames of bees, a third comb being added to accommodate any deserting the other nucleus hives. In due time the queen cells will hatch, and after the queens have mated

Small English Apiary.

and commenced to lay, they may be utilised for re-queening stocks where the laying powers of the queens are waning, or it is thought desirable to remove them for any other reason. Or the nucleus hive can be held in readiness to meet any unforeseen circumstance, or gradually built up to good colonies by the frequent addition of sealed brood from other colonies.

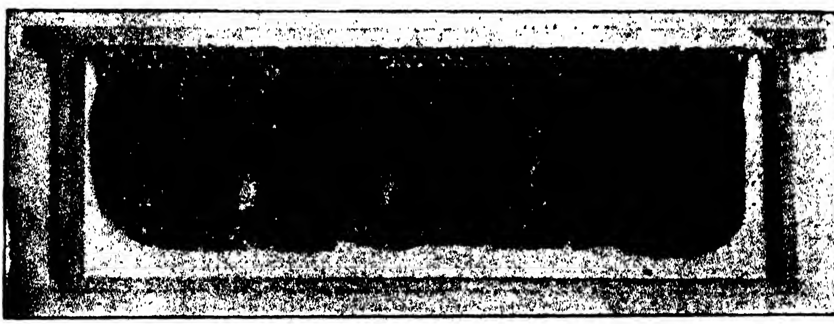
CHAPTER XXIV.

Queen Rearing.

We do not propose to go into the question of selection and points, which will be beyond the grasp of the amateur, but we think it is important that the beginner be made acquainted with the principles, and a few of the methods now adopted by the professional bee-man, which he may be able to apply after a little experience, and thus not only improve his own stock but at the same time assist in the general improvement of the honey bee in his locality and district.

The simplest part of the process is the *rearing* of queens. The control of their *fertilisation* is a more difficult matter. As already stated, queens mate on the wing and therefore, to obtain the full results of our attempts, it would be necessary, if possible, to regulate the supply of selected drones. If we could place bounds to the queen's flight and then insure that she only met the selected drones over this given area, the production of bees with certain given points would only be a matter of time and care, and could be run on the same lines as other stock. Although to-day we can be partially successful by careful selection and breeding of drones at certain times it is well nigh impossible to get exactly what we want with absolute certainty. And what adds to the difficulty in this country is the fact that in many districts drones are bred in strong stocks of undomesticated bees, and fly the whole year round.

On the arrival of warm weather, when an examination of the hives shows certain indications of early prosperity and the presence of drones in large numbers, preparations may be commenced for queen-raising. Having selected a stock with certain desirable qualities, open out the frames and insert a frame of foundation, or clean worker comb, in the centre of the brood nest. In three or four days a further examination will show that the foundation has been worked out and covered or partially filled with eggs.



Shallow frame showing worker cells, drone cells, and queen cells.

The queen must now be removed and utilised in some other hive, or nucleus formed for future use. On the discovery of their loss the bees will commence to raise queen cells, and if unassisted the probability is that most of the cells will be formed in positions where not wanted, and often difficult of removal. To obviate this, the following simple plan can be adopted: Remove the new comb containing eggs and cut it clean through in a horizontal direction about the centre. This must be done in a warm room or when the outside temperature is not less than 70° Fahr. Next make a series of cuts like an inverted V along the bottom edge of the top piece, directing the apex of the inverted V just below the bottom of every three or four cells. The openings of these cells should be slightly enlarged without disturbing the eggs or base of the cells, using a piece of wood slightly tapered for the purpose. The eggs must be removed from the intervening cells and contiguous to those prepared, also those on the reverse side of comb.

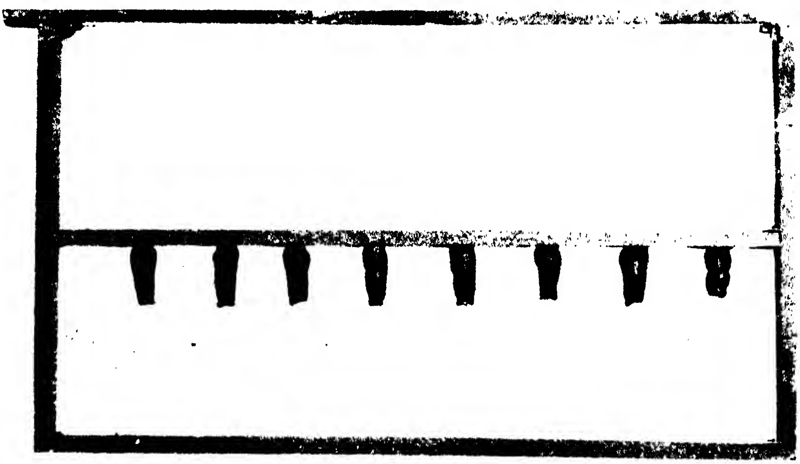
The comb should then be replaced in the hive, and all covered up snugly and warm. In ten days, conditions being right, a row of queen cells will be found hanging from the openings previously made, ready for forming nuclei. One or two cells may be found on the other combs, but the prepared one will receive the principle attention, the bees preferring

new combs for this purpose. Unless the hive is well supplied with stores, honey and pollen, gentle feeding must be carried on during the raising of queens.

It will be better not to undertake this work until both honey and pollen are easily obtainable.

Should it be considered inadvisable to create such a radical disturbance by removing a favourite queen in the way detailed, the frame of eggs can be prepared as directed and placed in another colony having an indifferent queen, after removing her and as much young brood as possible. Or the prepared comb can be inserted between the frames of a colony not long queenless. In this case any cells in course of construction must be cut away.

With the progress of modern bee-keeping and the desire to breed queens wholesale, further improvements have been made to increase the number of queen cells raised by a single colony and in a more convenient way for the use of the specialist. Although grafting of cells had been practiced for many years, it was left to Doolittle in America, we believe, to introduce the ingenious plan of making artificial queen cells, known as the cup method.



Frame with queen cells artificially prepared.

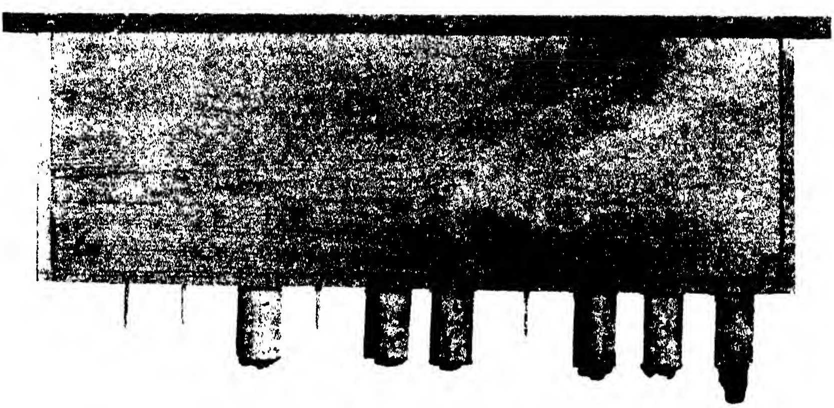
Mr. F. W. L. Sladen, in England, has done much during the last few years to improve the methods and appliances for carrying out these principles.

The artificial cell cups are prepared as follows: First two or three sticks of wood must be prepared, measuring about 4 inches in length, rounded up at one end to the size and shape of the large end of a queen cell—inside dimensions. These dippers, with a shallow tin for melting wax, a basin of water for cooling, and a lamp of some description for heating the wax, will complete the equipment for this part of the work.

Now to proceed. Dip the end of one of the prepared pieces of wood in water, then into the liquid wax to a mark previously made on the stick, about ⅜ in. from the end; allow to cool and then dip again. This process will probably have to be repeated about half a dozen times to get the base thick enough. Each time the cell is dipped reduce the depth a fraction so that the wax may be graduated in thickness to a very thin edge where the bees will commence their part of the work. As the cups become sufficiently set they can be removed and placed on one side ready for use.

The next proceeding will be to fix them in *in situ* for placing in the hive.

An ordinary brood frame is taken, and about half way up another horizontal bar is fixed. Each prepared cup is then taken and attached with a little wax to the underside of this bar; the wax used for fixing must be worked down a little so that the cell can be afterwards cut away without damaging the base. The cups should be spaced about one inch apart. To avoid cutting the cells off the bar they are now usually fitted in little wooden holders which have been bored just sufficient to receive the large end. The holders are provided with a spike, which is thrust into the horizontal bar. Another method of making the cups is also practiced. Several holders are taken which have been bored to the depth of about ½ inch and same diameter. These are warmed and filled with wax and, while soft, the rounded dipper is worked inside, forming the shape of the cell and allowing of sufficient wax to ooze out, leaving a rough edge ready for the commencement of the cell walls. Mr. W. L. Staden has further improved the method of fixing the holders to the bar, the spike being on the bar instead of on the holder; this in turn is fixed to a specially made board 13¾ in. x 5 in. x ⅛ in., having a ⅜-in. top bar nailed to it. We find the easiest way to make up this carrier is to take an ordinary shallow frame, remove the bottom bar, then fit a ⅞-in. piece of pine board between the top and side bars, tacking along the top bar and around the ends with 1-inch wire nails. This will keep the board from warping, and preserves the



Carrier with queen cell holders, showing cells in course of construction.

right dimensions for spacing in hive. Some ¾-in. wire nails are next driven through the bottom bar removed, about 1 inch apart, and the bar re-fixed in its former position, two or three nails being used to fix it more firmly to the inside board.

The stocking of the cell cups with larvae will be more difficult than preparing the cups for their reception, and some amount of patience will be required for this delicate work. After the holders with cups are fixed to the carrier, it is placed in the queenless hive to be used for queen rearing, where it should remain for about 24 hours, during which time it is supposed the aroma of the hive will penetrate it; and the workers running in and out of the cups will insure a better reception for the young larvae next to be introduced. For the purpose of starting the queen-rearing colony, it will be necessary to know that a supply of "royal jelly" is easily obtainable either from the hive just made queenless, or from another stock known to be raising queens. The transferring of the larvae must be undertaken on a favourable day, and as the operation will be some time about, the royal jelly, and frame of young larvae removed from the

selected hive must be handled in a warm room, the temperature of which must be regulated to within a degree or two of 77° Fahr. The utmost care must be observed in removing the young larvae from the hive to the work room and also in returning the carrier with the transferred larvae.

It will be advisable to place this in a closed box if the apiary is any distance from the workroom. Having everything ready, a little of the royal jelly is now taken from the queen cells and carefully deposited in each prepared cup, using a bruised match end, tooth pick, quill or other suitable instrument. Next look over the frame of brood from the selected queen and mark a few cells containing very young larvae, enlarge these cells by breaking down the surrounding walls and then carefully lift out the larvae with the adhering jelly one at the time, depositing in each of the prepared cups. A camel hair pencil will effect this part of the work very nicely with little danger of breaking the tender coating of the larvae. Carefully note that all are well supplied with jelly and are floating in the same position as before removal from the worker cells. This somewhat difficult task ended, lose no time in giving the carrier to the queen-rearing colony. All other queen cells in course of construction should be cut out, and it will increase the chances of success if all combs containing young brood are removed.

It is possible to raise queens in a hive while retaining a fertile queen, by providing a separate apartment to which the workers have access, but not the queen. But as this belongs to the province of advanced bee-keeping, we will not weary the inexperienced with the details.

If the larvae are accepted, the bees continue the building of the lower part of the prepared cups, which are sealed over in due course.

As soon as the cells are sealed, steps must be taken to introduce them into nuclei or each cell must be placed in a separate cage, otherwise the first hatched queen, assisted by the workers, will destroy the inmates of every other cell.

CHAPTER XXV.

Forming Nuclei.

We have already discussed methods of forming nucleus colonies by breaking up stocks that have swarmed, allotting queen cells to each portion. We shall now describe how nuclei can be made up from different hives.

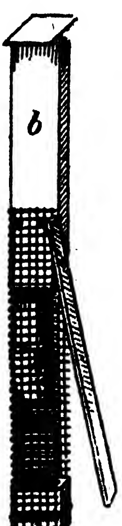
The queen cells as prepared under Chapter XXIV. being now ready for distribution, proceed as follows:—Firstly, the nucleus hives have to be prepared. These may be ordinary hives, or of smaller description, taking only three or four frames, to suit the fancy. If queen-rearing is not to be largely practised, a few spare hives of ordinary type may be used for this work. They should be provided with warm quilts, division boards, etc., and facilities for feeding under the roof. Next go round to the different hives in the apiary, which are strong enough in numbers for the purpose intended, removing from each hive two or three frames with adhering bees for each nucleus it is proposed to make up. One frame at least must contain sealed brood—younger brood is not required, particularly at this juncture—another frame should contain honey. The frames removed can be exchanged for frames of foundation. It will be a good plan to shake the

bees off another frame or two into each nucleus to ensure a good number going with the brood. The greatest care must be taken, however, that no queens are taken into any of the nucleus. The trouble in forming nucleis this way is the danger of these small colonies becoming impoverished in numbers, by many returning to the parent stock; in fact, it is most tantalising to see the way Cape bees desert nucleus hives. As a preventitive measure, which is usually successful in minimising this trouble, the entrance to nucleus hives should be plugged with grass or leaves, not too tight to cause suffocation, but tight enough to take those inside three or four days to gnaw their way out. At the end of this time they will be more settled, when the entrances should be cleared and the openings reduced to about 1½ inches in width, and still smaller, if robbers are noticed making any attempts to enter.

A ripe queen cell covered with a special wire protector can be given to each nucleus the evening following their make up, say, 24 hours after establishing. The cells can be given from the top, as already directed, making as little disturbance as possible. In about twelve to fourteen days after, with suitable conditions prevailing, the queens in the nucleus hives should be fertilised and laying.

Should the population of any nucleus get dangerously low during the first few days, more bees must be introduced, and in any case a frame of brood—some sealed and other in larval state—given about the time the queen will be going off on her wedding trip, will keep the little colonies from getting excited.

After all the queen cells have been removed from the queen-rearing hive, another batch can be given, or if no more queens are required, one cell can remain to furnish the future queen, to build up the colony to its former prosperous condition.



Sladen's Nursery Cage.

Virgin queens can be introduced to nuclei instead of giving queen cells by using nursery cages in the queen-rearing colony. The cells are placed in these cages, where they hatch without molestation. This method is not advocated as being superior to the last, except in saving of time after nuclei are made up. Two of the best nursery cages for this purpose are those introduced by Mr. Alley in the U.S.A. and Mr. Sladen in England. Alley's cage is made of a block of wood about 2½ inches square, with a 1½-inch hole bored right through and two smaller ones at the end, one for the insertion of queen cell and the other to contain candy food for the young queen; both sides are covered with wire cloth. Several of these cages can be placed together in a frame and hung in the hive to hatch.

Sladen's nursery cage is made to take one of the cell holders removed from the carrier, described in Chapter XXIV. A special frame accommodates about twelve of these cages. The frame is dropped down between the brood combs of a strong colony for the queens to hatch, where they can remain for a few days, until wanted; any single cage can be withdrawn from the top with very little disturbance to the colony. Various other methods for hatching queens on top of the brood nest have been tried. Another plan is by using suitable incubators heated by lamps, but these complicated systems do not call for special notice.

CHAPTER XXVI.

Queen Introduction.

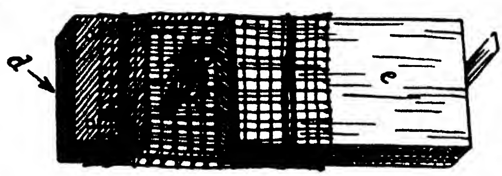
Queen introduction being a part of the practical work in a modern apiary, we shall give a few simple methods, either of which are usually successful. Probably the most simple of all is that known as the "Pond" method. Remove the old queen about noon. During the afternoon the bees will have discovered their loss, and towards evening will be showing signs of great uneasiness; now, just before dark, liberate the new queen at the entrance, when she will run in and will usually be received without further trouble. Mr. Simmins's "Fasting method" is somewhat similar, only the queen is run in at the top of the hive.

As this method has met with general approval and is largely practised, we give Simmins's own directions:—

"The three things of importance to be observed are as follows:—(1) Keep the queen quite alone for not less than thirty minutes; (2) She is to be without food meanwhile; (3) and to be allowed to run down from the top of the frames, after darkness has set in, by lamplight. It is also important that the same receptacle be not used twice over for holding the queen during the thirty minutes probation without first being scalded or otherwise cleansed. Of course a metal cage is easily made clean though there is no objection to the cheap "Safety" match boxes so commonly in use, as there is nothing obnoxious about this kind. My own practice is to carry the queens in the vest pockets in small tubular cages made of fine perforated zinc or tin, one end permanently closed while the other end is pressed into a piece of foundation after the queen is in, when ready, remove the foundation and let her run into the hive. Caution—Make no examination after inserting a queen, by either of the two foregoing plans until 48 hours have expired."

"The above meets all requirements, whether the colony has been long or only a short time queenless, if it has brood or not or queen cells in any stage of development. It is also applicable to any season of the year."

Having given two methods of direct introduction, we will now describe two or three methods of introducing queens by caging. South African bees are rather inclined to ball alien queens, so precautions are advisable. The candy-introducing cage is a very popular method. This is simply a small block of wood with piece of wire cloth shaped to fit, having two smaller wood blocks at the other end, kept together by pieces of tin on either side. An opening is left in centre, which is filled with soft candy, as described for feeding bees. The queen is inserted by the removal of the larger block, and the cage is then placed between two frames. In about 18 to 24 hours the bees will have eaten the candy out and liberated the queen without any disturbance. A Benton travelling cage can be used for the same purpose, but when containing queens from abroad this plan should not be adopted. The queen should be removed from the travelling cage and the cage with candy and worker bees accompanying queen must be *destroyed as soon as possible* after arrival. And in no case should these cages be used a second time.



Candy introducing Cage.

If it is desired to witness the acceptance of a valuable queen, she must be introduced by the means of a "pipe cover" cage; this is a piece of wire cloth folded up by cutting the corners out of a piece about 2 inches square. The cage with queen should be placed on a part of the comb containing a few cells of honey under the cage; the loose strands of wire will keep the cage in position. In about 24 hours smoke the bees and sprinkle with thin,

warm syrup; after a few minutes take out the frame with cage attached, and observe the general demeanour of bees. Should they be feeding the queen in her captivity through the meshes of the cage or appear unconcerned about her presence, quietly release her. Now be on the alert. Should a marked change take place in their treatment, and the workers begin to ball her or commence biting her wings or legs, immediately separate them, sprinkle with a little more syrup, and re-cage her; trying the experiment again the next day. If on opening the hive the workers are found crowding all over the cage, vigorously trying to sting the occupant, it will be useless to attempt liberating the queen under such circumstances. Clear the workers away from the cage, sprinkle with syrup or a little flour, and close the hive up again for another 24 hours, when the queen will probably be released without any further difficulty. Work in such a way as to exclude the presence of robbers while engaged in the operation of liberating queens.

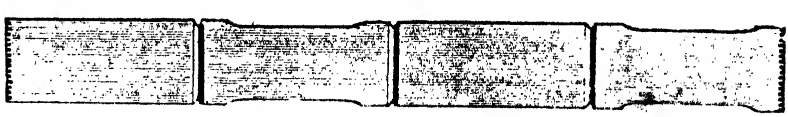
Travelling Queen Cage.

CHAPTER XXVII.

The Production of Honey.

Bee-keeping without honey might suit the naturalist, but the primary thought and object of most people we meet with who keep bees is to obtain the largest amount of honey with the least amount of trouble.

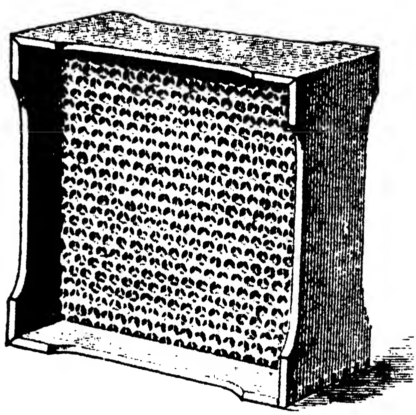
In this connection the writer is reminded of a little incident that took place in his own experience some few years since, when giving a course of lectures on Bee-culture at the Victoria College, Stellenbosch. Two or three classes had been held, and parts of the subject similar to those of the preceding chapters of this work had been dealt with, which was apparently rather dry for some wag amongst the students, for when the writer returned to give the next lecture—which was to include some practical work in manipulating live bees—he found posted up on the blackboard the following inquiry: "Zal ons van dag wat honig krij " ("Shall we get some honey to-day?") Some of our readers may, like this student, have the honey surplus so prominently before them that it may eclipse other important phases of management. To such we would point the moral. Our


Two way section in flat.

young friend above mentioned obtained the honey that afternoon, but having neglected some part of his lessons, he found his joke—as expressed by Uncle Hiram, the American bee-keeper—had "got a gol darned sharp pint ter it." But to proceed.

There are different ways of obtaining surplus honey. Those known as back supering, top supering, and doubling being the most popular. Back supering is removing the surplus from behind a queen excluder diaphragm placed in any part of the hive in the rear of brood nest. This plan has now to a great extent been discarded, necessitating as it does a longer hive, with increased cost. Tiering up and doubling is more in keeping with the natural instinct of bees, their rule being to store honey away from the entrance and above the brood nest. In this position it is further removed from robbers—the *genus homo* excepted—and in the best part of the hive for ripening.

Comb honey for commercial purposes is now generally produced in what are called "sections." These are small wooden frames, which are placed close together in an upper story, enclosed on all sides by what is called a rack or super crate. The most general sizes of sections are 4¼ in. square, varying from 1½ in. to 2 in. in width, holding, when completed, about one pound of honey. Some bee-keepers prefer a section a little taller than wide, say, 5 in. x 4 in. A crate of section may contain any number, but twenty-one or twenty-four are the usual complement. Sections are known as four bee-way, two bee-way, and no bee-way. The latter seems to be gaining ground, although we have had most perfect combs produced in the two-way sections. In working sections it is necessary to use separators between each row to confine the comb within the edges of the section, every one of which must be complete in itself when finished, with no part of the comb encroaching on its neighbour. The four-way and two-way sections admit of communiciation by means of the cut edges, the separators being kept at the right distance by the shoulders of the sections. With the no bee-way pattern it is necessary to use separators known as "fences," having cleats planted on to allow of bee passages. With the propolis-loving South African bees these need careful adjustment. Under exactly the same conditions bees store in each pattern with about the same amount of alacrity. Sections must be fitted with either full sheets or starters of foundation; this foundation should have a reasonably thin base, but the side walls can be thicker and left soft from the mill. Some manufacturers by using great pressure toughen the wax to such an extent that while pleasing to the eye of the bee-keeper, is not worked out by the bees, but only accepted by them as a guide. Racks of sections should not be placed on the hives until there is plenty of hatching brood coming forward, and the stock occupying some 8 to 10 frames.

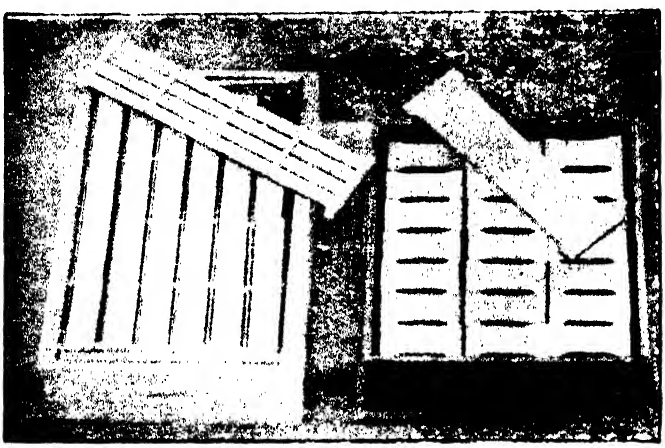


4¼ x 4¼. Four way section fitted with founda'ion.

Foundation can be fixed in sections by several simple means. Running a little melted wax along the angle as described for fixing brood foundation is a good plan. Melting the edge with a metal tongue, or fixing by a wooden lever gauge, known as the Parker fixer. A small piece of hard wood or

handle of table knife rubbed briskly along the edge of foundation in contact with section, before folding up, will answer very well; a lath being used for a gauge and to turn the foundation up at right angles to top of section. Sections may be worked above brood frames without queen excluder below, but there is always a risk of the queen going up and depositing eggs, especially if drone comb is built in the sections.

South African bees, like most yellow races and their off-shoots, are not inclined to "rush" the sections by any means, very often a tempting bait being necessary to induce them to go up. With the beginner this is often a serious difficulty. The following are often contributory causes to this disinclination to start work: The supers may have been put on too early in the season before sufficient bees have been reared to crowd into this additional space. If the hive is sparsely populated the supers will be too cold at night, when the bees withdraw to the brood nest below. On the other hand, very often the supers get too hot, and in the absence of proper ventilation the bees vacate the sections to loiter about outside the entrance. These two extremes are particularly noticeable with single-walled hives. Double-walled hives meet both these objections, affording warmth during the night and shade during the heat of the day.



(*a*) (*b*)

(*a*) Section rack with no bee-way sections and fence.
(*b*) Section rack with two-way sections and plain separator.

It may be said that there are a number of single-walled hives in use in this country. Granted; but that is no proof that a single wall hive is the most suitable. At first glance it may look cheaper, but in the long run the double-walled hive has many compensating features. We have both kinds in our apiary, so are in a position to judge of this assertion.

Root, who is one of the largest manufacturers of single wall hives and is often quoted in this country, says:—

"At our own home apiary we prefer the double-walled kind to the single, because it is nearly as light, and because in our locality we can leave the colonies in these hives winter and summer. The double-walls also afford excellent protection in hot weather, in the same way that the walls and packing material of a refrigerator prevent a too rapid melting of the ice within."

Racks of sections may be tiered up according to the population of the hive and the yield of nectar. Experience here must be the teacher. By studying the local flora of the district (the nectar secreting), the bee-keeper

will be in a better position to judge when he may expect the honey harvest, and with this knowledge in his possession—which it would be impossible to impart through the medium of these pages, owing to the varying conditions of different districts—he will seek to have his colonies strong for the ingathering and every appliance ready when the honey glut arrives. In some parts of South Africa the seasons are of short duration, while in others there is a steady supply of nectar obtainable almost all the year round.

In removing sections, almost every other method is now eclipsed by the use of super clearers. As soon as any rack or sections is completed it should be lifed and the super clearer placed underneath; if this is done in the evening most of the bees will have passed through the bee escape by the following morning, when the section rack should be removed indoors. The sections are then taken out and stored in a safe place against the admittance of bees or mice.

Porter Bee Escape.

Honey for extracting from the comb is produced in shallow frames, or frames of brood size, placed above the brood nest for preference. The tendency amongst bee-men is in favour of using shallow frames about 4 to 6 inches in depth, in preference to deeper ones, the shallow ones being found more convenient and allowing of a more gradual increase of space. The shallow frames are hung in the same way as brood frames, and can be spaced two inches from centre to centre. A queen excluding board must be placed below shallow frames. If it is intended to cut the honey out in slabs it is not necessary to use full sheets of super foundation. A starter will suffice in this case; but for extracting purposes, light brood foundation is best, wired into frames. Boxes of shallow frames can be tiered up to any height governed by the same conditions as those given for producing comb honey. The super clearer can be brought into use when removing shallow frames, or each comb can be removed singly, the adhering bees being brushed back into the hive. In taking off surplus honey clear everything up as you go: pieces of comb, or drops of honey left about the hives or precincts, will act as an incentive to robbery, of which more anon.

Uncapping Knives.

"Extracted honey," so called, is removed from the combs by centrifugal force. They are then returned to the hive to be re-filled. Honey obtained by this means is clean and free from the usual admixture of pollen and young brood which enters largely into the compound known as "Strained honey."

Having removed the frames of honeycomb to the extracting room, if the honey is sealed—as it ought to be before removal—it will be necessary to slice the cappings off from both sides of the comb. A carving or other large knife will do this work fairly well, but if there is much to be done it will be advisable to employ a pair of special uncapping knives for the purpose. The knives should be placed in a vessel containing hot water, and use alternately while warm.

The circular honey extractor, as illustrated, is a large tin cylinder, in which a cage revolves round a central rod or spindle having one end running in a bearing at the bottom and another at the top carried by a cross-bar, to which the gearing is fixed. The cage is made to take two or more combs. After uncapping, the combs are placed in the cage, and by revolving the cage at a moderate speed the honey is thrown out against the sides of the cylinder, collecting below the cage. The reverse side of the comb is then treated in the same manner. The honey is drawn off by means of a treacle tap.

Honey Extractor.

In addition to the methods of obtaining surplus honey as detailed above, a large quantity has been procured by some apiarists by what is known as the "Wells" or "Pond wells" system. Briefly, it means running two queens in one body box, having a perforated partition in the centre; the openings in the partition—which is made of wood—while allowing the same odour to penetrate the entire hive, prevents the workers or queens from coming in contact.

As the season advances a queen excluder is placed over the brood frames and super put above this; the workers are here allowed to co-mingle and store their surplus conjointly.

CHAPTER XXVIII.

Robbing.

One of the troubles that *may* confront the apiarist any day is the suppression of robbing.

The old saying that "prevention is better than cure" is very applicable in the apiary. Spring and autumn are the two seasons for the bee-keeper to be on the alert; for should robbing be commenced, it must be "nipped in the bud." No syrup or spare combs of honey must be left about uncovered at this season; all feeding must be done in the evening; the colonies receiving syrup must have the entrances contracted and every preventitive measure possible must be adopted. Robbing can be detected by the appearance of the bees at the entrance. It will be noticed that a number of extra guards have been posted, and some will be observed dashing about the alighting board seizing one robber after another and hurling them to the ground with torn wings or maimed limbs. If robbing is fairly established in an apiary the owner may reckon upon receiving a fair share of the bees' vindictiveness, to say nothing of the probable loss of some poultry and the howling of the neighbours' dogs, while stings are being plentifully inflicted. Immediately robbing is detected, reduce the entrances to about 1 inch in width, or smaller. In the case of nucleus hives, weak colonies, or queenless ones, reduce the opening so that only one bee can go in and out at the time. A piece of rag saturated with carbolic acid solution placed just above the entrance or a piece of glass placed across the entrance, a sheet sprinkled with carbolic solution, and thrown over the hive, are all means that can be taken to baffle and drive off the intruders.

If desperate in their attempts to gain admission it may be necessary to close the entrance entirely, not neglecting ventilation, in some other way. Or wet grass or shavings can be banked up against the entrance.

If the robbers can be traced to any particular strong stock, the two hives may exchange places for a day or two; utter confusion being thereby produced. We do not, however, recommend such drastic measures. A certain cure is to remove the besieged colony to a dark cellar for about 36 hours. On the return of the hive to its stand watch to see if robbers again make their appearance, keeping the hive closed meanwhile. If the aggressors put in an appearance, wait until a fair number have collected about the hive, when they should be sprayed with water containing the slightest trace of carbolic acid, using a garden syringe. Care must be observed that none of the solution goes into the hive. The robbers having now cleared for good, the entrance can be opened slightly.

CHAPTER XXIX.

Feeding Bees.

By good management, feeding bees by artificial means can almost be dispensed with in this land where natural sources abound almost at all times. Providing colonies are not "robbed" right out they usually manage to secure a "hand-to-mouth" existence, even during bad seasons. At times, however, the bee-keeper will find it desirable to augment the natural supply by having recourse to syrup or candy feeding. Colonies should not be deprived entirely of their stores at any season of the year. We find many people who keep bees require a little caution in this direction. We had a case before us a few weeks since where the over-reaching owner, not being satisfied with what surplus he could obtain from the supers and outside frames in the body box, had deliberately carved out the top corners of the brood-combs—which part frequently contains honey—leaving only a few inches in the centre attached to the top bars to carry the whole weight of the remaining comb, loaded with brood (in Langstroth frames too). Needless to say such avariciousness is not commendable, and with a possible quick rise of temperature and the chances of the combs breaking down entirely, is a risk that certainly few bee-keepers would care to run.

We might mention that living not far from the man just referred to is another man who is in the habit of feeding his bees with syrup after putting on the supers. This is another reprehensible act which must ultimately receive its own reward.

Owing to great variations of climate in the different parts of this sub-continent, it would be impossible to lay down hard and fast rules for feeding bees. It is often important to know *when not* to feed. That colonies in up-country districts, subject to severe and protracted cold weather, should be well supplied for this season is desirable, but feeding with 20 to 30 lbs. of syrup preparatory to winter, as required in Northern latitudes, will not be necessary. The weather in no part of South Africa is ever so severe but what a slight examination of the colony can be made by turning back the quilts, when, if stores are found to be low, a little suitable food can be given as required. Care must be taken that colonies are not stimulated to abnormal activity at the wrong season, which it is very easy to do. Queens should be allowed to rest at some period of the year, which will again vary in different parts. The early winter months probably being the

best time for the higher altitudes, and for several of the coast districts the months of December and January are times when excessive breeding should not be encouraged by stimulative feeding. Feeding at any time with syrup should be avoided as much as possible. If not carefully done, it is a direct encouragement for robbers and the visitation of ants. Of course, weak colonies and nucleus hives must be looked after, and these should be supplied with frames of honey in preference to syrup feeding. Swarms placed on foundation can be fed with syrup for a few days, to encourage the working out of combs.

Feeders.—Amongst the large assortment of feeders and feeding appliances there is nothing simpler for general purposes in the hands of the novice than the old method of feeding with an inverted bottle above the brood nest, and with the slight call for artificial food in South Africa, this plan is usually satisfactory.

It is prepared as follows: Take a small jam jar or pickle bottle, and after filling it with syrup made as directed, tie a piece of butter muslin tightly over the mouth. Next prepare a stage for the bottle by taking a piece of wood about 6 in. square and 1½ in. thick, and cutting a circular hole in the centre large enough to pass the neck of feeding bottle. Cover this hole on the underside with perforated zinc or a piece of tin having several small holes made in it by a fine bradawl or small nail. After cutting a hole through the quilts same diameter as mouth of bottle, place the stage in position, then insert the bottle of syrup, being careful that it stands perfectly steady and level. Atmospheric pressure will prevent the syrup running through faster than taken down by the bees. A screw cap jar with a few perforations can be used instead of muslin if preferred. When the feeder is in position cover all up snug and warm, and observe that there is no possible chance of bees getting to the feeder from the outside of hive. Those using the American single wall hive are generally advised to use the "Broadman" feeder, which is made somewhat on the same principle as the one just explained; the stage is fixed on a runner which is placed in the entrance. Needless to say this is a direct inducement to robbing, many a weak colony being wiped out of existence through carelessness in adjusting this type of feeder. A good plan will be to use a division board feeder in the case of American hives, or better still, remove the roof and place a crown board or quilts over the brood frames with hole as directed for first method, and use the inverted jar, putting on an empty super case to give necessary height for feeder. The roof will make all secure against intruders from outside.

Preparing the Food.—Syrup suitable for feeding healthy bees is prepared as follows: To every pound of white lump or granulated cane sugar add ¾ pint of water, a pinch of salt, ½ teaspoonful of vinegar, or a pinch of tartaric acid. Heat to boiling point, stirring the while to prevent burning. This food can be given at any season without injurious effect. For medicated syrup see subsequent chapter on "Diseases of Bees."' Some may prefer to feed with candy instead of syrup, which is quite suitable for winter and spring food, if sufficient care is taken that ants do not take up their abode adjacent to it. To prepare candy, gradually heat up ¾ pint of water to boiling point, adding gradually meanwhile 5 lbs. of lump or granulated cane sugar, well stirring the whole time. When it has boiled and is becoming stiff, drop a little into a glass of water, if it hardens, the candy is finished, and while hot can be run into plates lined with paper, or frames, for placing under the quilts, or direct into the hives.

A softer candy can also be prepared which is useful for a variety of purposes, by kneading the finest white cane sugar and warm liquid honey until a stiff doughey paste results. This should not be given to the bees

for a few days, during which time more sugar can be worked in. Care must be taken that it is sufficiently tough not to run down between the frames when subjected to the heat ascending from cluster.

Artificial Pollen.—There are times when it may be advisable to supply bees with artificial pollen, although this is a very unlikely contingency.

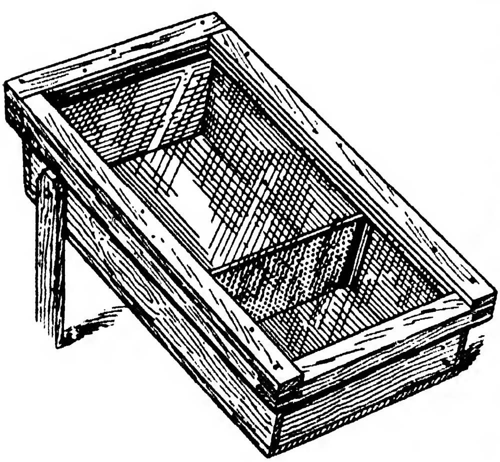
Obtain a tray or shallow box of some kind and place in it some sawdust, chaff, or fine shavings; dredge this material with pea flour, wheat flour or fine oatmeal, and place in a warm sheltered situation, a piece of honeycomb being put in the tray by way of attracting the bees to the pollen. A little pea flour can be stirred into the candy if required, but this must be done after the candy is removed from the fire.

Water.—During the summer months bees should be supplied with fresh water in the immediate vicinity of the hives. This can be given in large, shallow tins containing stones or wooden floats, which will allow the bees to alight and obtain a supply without fear of drowning.

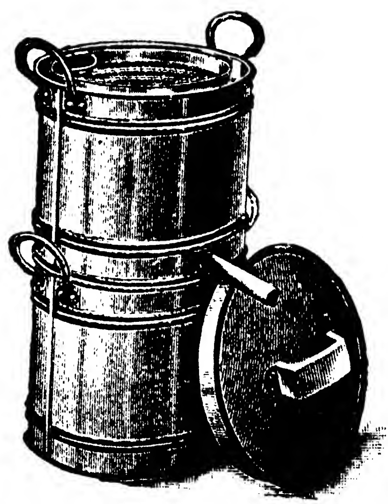
CHAPTER XXX.

Wax Rendering.

Small quantities of wax can be extracted by breaking up the combs and placing in a fine sieve over a pan or basin of water, this to be stood in an oven moderately heated. If the temperature of the oven is too high the wax will lose its natural aroma, and also waste by volatilization. After removal from the oven the wax will be found floating on the surface of the water, solidifying as it cools.



Solar Wax Extractor.



Steam Wax Extractor.

The cooling process should be prolonged for a time to allow of all foreign impurities settling to the underside of wax cake.

Another plan is to tie the combs up in a canvas or muslin bag, and weight to the bottom of a vessel containing water. This is then to be set over a fire and heated to boiling point, the temperature being maintained until all the wax has boiled out through the meshes of the straining

medium and found its way to the surface of the water. Cool down slowly and remove when cold. A solar wax extractor is useful for running down wax cappings and odd pieces of clean comb; the illustration is self-explanatory.

Where there is a larger quantity of wax and old combs to be dealt with a wax steamer will be found useful. The combs are placed in a wire basket supported above a boiler, where they are subjected to the action of the ascending steam. As the wax melts it is caught by a channel around the inside of steamer and conveyed by a spout to a vessel containing warm water.

CHAPTER XXXI.

Bee Enemies.

First in the catalogue under this heading are found species of Sand Wasps, *Fossorial hymenoptera*, the two principal ones bee-keepers are interested in being *Philanthus* and *Palarus*, known as "bee pirates." Some interesting notes on these formidable enemies from the pen of Mr. C. W. Mally, F.E.S., of the Entomological Department, have recently appeared in this *Journal*. As our observations in the main agree with Mr. Mally's, we have pleasure in directing the attention of readers to this article, with the hope that an organised attack will be commenced on these creatures by destroying their nests, as I have frequently advised in the past issues of the *Journal*.

Wax Moths.—Next in importance to "Bee Pirates" are the wasteful Wax Moths, large and small kinds. The ramifications of these insects are best known to the *careless* bee-keeper. In a well-ordered apiary there is not much chance given for their destructive habits. The cure for Wax Moths is to contract the space occupied by bees to the size of the cluster, leaving no combs which are not covered. All spare and disused combs, which are sure breeding places for Wax Moths, should be either melted down or kept in a closed box, a piece of stick napthaline placed in the box or an occasional fumigating with sulphur or formalin securing their preservation.

Ants.—Ants are often troublesome, the white ant standing first amongst the numerous sorts and sizes which combine to annoy the bees and interrupt the work of the bee-keeper. With regard to the white ant Mr. F. H. Winson, a large apiarist in Natal, in writing to the author, says: "Given the least possible opportunity, especially after rain, they will construct their mud works until they burrow into the wood, and unless you are quick you will very soon be is possession of mud-bottom hoards instead of wooden ones; unless stopped in time they will eat the whole of the wood work." The smaller descriptions of ants are prone to take up their residence under the covers of hives and amongst the quilts—usually for the warmth they receive, which assists the incubation of their eggs. They are fond of sweets, and sometimes make a raid on weak colonies, and frequently find their way into stronger ones. Where ants prove a source of annoyance the legs of the hives should be stood in tins containing water or oil, or parts of the hive in contact with stand can be painted over with carbolic acid, turpentine, paraffin or any of the solignum class of preparations. For destroying nests paraffin or tar can be poured into them or bisulphide of carbon placed in the nests, but as the latter is a dangerous explosive it is not recommended for general use.

Braula Cæca.—This tiny, almost microscopic parasite, neither spider nor bug, is found on South African bees, as on bees of most warm climates. It is often a source of anxiety to the novice but would probably escape his attention but for its reddish colour in contrast with the more sombre hue of the bees. It seems to have a particular liking for the queen, four or five often being seen clinging about the thorax of her majesty; unless in excessive numbers we have not found that they handicap the queen at all in her duties; if removed others soon take their place. To rid a colony of them entirely is somewhat difficult, but as the pupa are mostly found on the floor boards we advise changing the bees and frames over into a clean hive and fumigating with tobacco smoke *en route.*

Mice, Toads and *Lizards* frequently come quite uninvited where the floor boards of hives are not raised from the ground by some sort of stand.

Spider's-webs should be kept clear of porches and overhanging projections.

Chelifers, Bee-mites and *Beetles* are occasionally met with, but do not call for special mention.

The Praying Mantis.—This insect, also known as the Hottentot god and in South America as the "Devil's Racehorse," is found in a few districts, but principally in Natal.

Death's Head Moths often gain access to hives; they have a great relish for honey, and are quite fearless of bees, their thick woolley covering protecting them from stings.

Birds.—Last, but not least, in the category going under the head of bee-enemies, there are a few birds, I am sorry to say, that are not satisfied with hopping round and picking up the dead bees, but are frequently found at the entrances of hives, making a morning meal of live bees. But as the greater portion of their time is better occupied in catching and destroying many other insects—enemies of the farmer and gardener—I refrain from mentioning their names, asking bee-keepers to look over this little provocation for the general good.

CHAPTER XXXII.

BEE DISEASES.

It is a pleasant duty to be able to record that South African bees at present are singularly free from the more serious diseases known in other parts of the world, climatic conditions and freedom from pre-disposing causes being undoubtedly helpful in this direction.

Often has the writer been called in to diagnose on specimens of supposed disease causing anxiety to the bee-keeper, over-heated brood, chilled brood and starved brood being frequently submitted for examination, but seldom has he had examples of anything of a pathogenic character to give cause for serious apprehension. At the same time it behoves every intelligent bee-keeper to keep the "weather eye" open, not only on their own stocks, but over those of their less-informed but none the less responsible neighbours. During the last ten years foreign bees have been very largely imported into the different Colonies and States of South Africa, to a far greater extent than is generally known, and very often not by the best instructed; so that it is impossible to scout the possibility of some well-known disease turning up in some unexpected quarter at any time. Regulations dealing with the importation of bees, honey and wax have now been promulgated.

We do not propose to go into a lengthy description of all the various diseases occupying the minds and attention of bee-keepers in other countries, but shall briefly indicate the symptoms of a few, with directions for general treatment should any suspicions be entertained of their occurrence.

Foul Brood and Black Brood.—Before giving the symptoms of these diseases it will be necessary to make a few general remarks. At the present time, owing to recent investigations, much confusion exists as to the true nature and import of these two diseases, which previously, in the minds of most bee-keepers, had been widely separated.

Until some ten years since "foul brood" was universally understood to be caused by the presence of a microbe named by Cheshire and Cheyne in 1883 as *Bacillus alvei*. The characteristics of this disease were the same in all countries where it had, unfortunately, gained admittance. However, about 1898, an apparently new disease broke out in America, which caused great havoc. This was designated "Black brood," the symptoms differing in several particulars from "Foul brood." Since then some authorities have endeavoured, rightly or wrongly, to associate these two diseases, and have gone so far as to denominate them "American foul brood" and "European foul brood." Others have taken up the investigation, studying them side by side with a view to more definite diagnosis. The work has so far yielded nothing definite for the practical bee-keeper.

From what the writer has been able to glean from a study of the work of the bacteriologists at its present stage, either "foul brood," as known for many years, is undergoing a change owing to association with other known or unknown bacteria, or that "black brood" is a new disease which may be accompanied by *Bacillus alvei*. For the present I am inclined to respect the more conservative ideas of such men as Mr. T. W. Cowan, who has made the question of brood diseases a lifelong study. "Black brood" has recently appeared in England, and at the end of 1907 was making rapid headway on the Continent of Europe.

Foul Brood (Bacillus alvei)—Symptoms.—Decline in prosperity of colony, larvæ presenting unnatural and unhealthy appearance in the cells. Instead of lying curled round, are found to be stretched out; later, becoming discoloured, eventually turning a dirty yellow and brown. Many caps of sealed larvæ concave instead of convex, some darker than others, several punctured. Remove the capping of one of the cells and with a pin or match end attempt to take out the contents; it is coffee coloured, and smells very offensive, with a ropy, tenacious consistency. This latter is the leading characteristic of foul brood, in which it differs from any other known disease. The healthy bees being soon unable to remove these decomposing bodies, the combs eventually become a mass of rotting brood, its evil smell being noticeable by this time some distance from the hive. *Remedies.*—For very mild case feed with medicated syrup as described. If more advanced shake all the bees into a box with perforated lid, confine for 48 hours in cool, dark, ventilated cellar, and feed with medicated syrup. At the end of this time place on foundation in clean hive. Destroy old hive and combs by burning as soon as possible after bees are taken away. If possible feed all other colonies for few days with medicated syrup. If bad case destroy hive, bees and comb. Be careful to thoroughly disinfect person, clothing, smoker and tools used in operating, carbolic or cyllin being suitable for the purpose. The less virulent form of foul brood sometimes met with has the same characteristics but free from the objectionable and nauseating odour of the other type. *Remedies.*—Same as last.

Black Brood—Symptoms.—Similar to those of foul brood; larvæ older when attacked, has a yellowish brown spot near the head which enlarges as the larvæ grows, as the larvæ reaches the pupa stage it becomes

discoloured, and finally black and dies; the ropy and glue-like consistency of foul brood and odour absent. *Remedies.*—Same as foul brood.

Bee Paralysis.—Affects bees in this country, usually in autumn. *Symptoms.*—Distended, shiny abdomen, hundreds of bees running about on ground around the hive, having fallen from floor board, tottering gait, trying to fly, but unable, as though held down by too much ballast. *Remedy.*—Pour a little luke-warm salt water between combs and feed with medicated syrup.

Sour brood, Pickled brood, Steinbrut or mummified brood, Maikrankheit and the recent Isle of Wight disease, all have their distinctions, slight or otherwise, and about which more will doubtless be known in the near future. The writer investigated a few months since and still has under consideration what may yet prove to be a new bee disease. In a measure it favours Pickled brood and Steinbrut of other countries.

Medicated Food.—Phenol, formic acid, and napthol beta, are a few of the remedies used for medicating food for the use of bees, napthol B. being a very safe and tried remedy; we give directions for its use only. Dissolve one ounce of napthol beta in fourteen tablespoonsful of spirits of wine, thoroughly shaking before using. Add two teaspoonsful of this mixture to every five pounds of syrup *when removed from the fire.* For directions for making syrup, see Chapter . The napthol B. solution can be added to candy in the same proportion.

There is no objection to feeding bees with medicated syrup at any time, and it is certainly a safeguard.

Concluding Notes and Hints.

Hives should not be moved in the apiary more than two yards a day, and then only on days when bees are flying freely.

Bees recognise no spot but the old stand as home. Remove the hive five yards and they are lost.

The bees' flight from home covers about a two-mile radius; hives can be moved a greater distance at any time; few bees will return to the old stand.

A cool night is the best time for transporting bees; give plenty of ventilation during confinement.

Always feed bees in the evening

Keep a diary of all that happens in the apiary; number all stocks, know their history, age of queen, etc.

Note rainfall, maximum and minimum temperature, direction of wind and general weather conditions for each day.

Don't keep bees in any but movable frame hives; don't purchase hives that will require a sledge hammer and chisel to open them, when they have been in use for a few months.

Keep the bees as far as convenient from your pigs and poultry, and don't keep animals of any description tied up in the immediate vicinity of bees.

Exclude all animals from the apiary by enclosing with wire netting.

Don't keep your bees waiting for the hive, but have the hive in readiness to receive the bees.

Bees are the best friends the fruit-grower can have; they assist in cross-fertilisation. More bees, more fruit. The old theory of bees puncturing grapes and destroying fruit has long since been exploded. Do you still assert they do? If so, let us know how they do it, sending few examples, and include a few not punctured for comparison. We have heard it said that bees carry away raisins during the drying process. Have you seen them?

Hear what Messrs. H. E. V. Pickstone and Bros., the large fruit-growers, say on the subject. Their opinion given to the writer is as follows:—"The theory of bees being detrimental to fruit is quite a fallacy. We consider that they are advantageous in the orchards. Many varieties of trees require cross-fertilisation, and the bees are very useful in this respect. We consider that every orchardist should have a few hives on his farm, as we ourselves have. With regard to spraying, codlin is so very prevalent nowadays that we spray as soon as the blossoms begin to fall and right on from then through the summer."

Study the bees when spraying your trees.

What is the difference between a person that keeps bees and a bee-keeper?

Recipe for sore throat and night cough: Liquid honey and juice of lemon; take it warm.

A few more remedies for stings: Hudson's soap, sal volatile and carbonate of soda; vinegar, juice of onion, tobacco, olive oil.

Don't be selfish with bee knowledge acquired; help your struggling neighbour.

Don't start queen rearing before you know the difference between a drone and a worker.

BEE-KEEPING IN NATAL.

(Specially contributed by Miss M. Ritchie.)

The old naturalist theory that bees in warm countries do not store honey, having no winter to provide against, has been entirely disproved by practical bee-keepers within recent years; in America and Australia comb honey is sold by the car-load and extracted by the ton. That similar harvests await scientific bee-keepers in South Africa is not unlikely, but so far honey must be classed as one of the "sample" products of the country. It has been proved, however, that honey *can* be produced in South Africa that in appearance and flavour will bear comparison with the finest "extra grade fancy" of other lands.

That there should be so few bee-keepers is not the fault of the country—a country in which one can practically live in the open air—or of its bees. Hundreds of wild swarms have their homes in the kloofs. From the early spring when the bush trees blossom, through the heat of mid-summer the bees are busy, on until the autumn, when the last veld flower withers, and the grass is burnt and bare. The honey is stored for the most part in lonely, inaccessible places in the cliffs—sometimes resulting in magnificent honey "takes" and sometimes robbed by the natives and presented for sale at the white man's "kia" a woeful mixture of honey-comb, bee-brood, dust and pollen. A native "umfaan" in the honey

season "all over stick" is a sight not readily forgotten. Like other small boys, he likes honey; he sucks it greedily, beaming happiness; a bee stings him, he rubs the place with his sticky hands, the red mud adheres, and soon he is honey, mud, and dust over head and ears.

In many places there is an abundant harvest from wild flowers alone, but everywhere with advancing cultivation forests and orchards are taking the place of thorn-veld and shrub. Numberless fruit trees have been planted, and much of their sweetness remains ungathered every year. Through the warm spring dusk comes the perfume of the orange blossom, the sweet honey-scent of the loquats, the fragrance of the mango, from thousands of blossoms brimful of sweetness, that wait for the bees.

In other countries no picture of a rural cottage is complete without its row of skeps at front or gable end. They are suggestive of security and peace. They speak as surely as the ivy that curtains the windows or the honey-suckle that twines among the roses on the porch of days and weeks of quiet sunshine. We feel sure the inmates as they go out and in never fail to watch the bees, and note through them the progress of the year. For by their flight they mark the first spring day, their joyous hum proclaims the apple trees in bloom, the drone's loud buzzing is a very part of the indolence of summer, while the workers' eager journeyings suggest the sweetness of the honey-comb, the deliciousness of new brown bread, the scent of apples and all the joys of harvest time.

This air of settlement and peace is lacking in the new colonial home, and, comparatively speaking, all colonial homes are new. There are colours only time can tone and things that only time can bring. In a new country like South Africa changes are more likely, absence and even desertion of the homestead, all may be sold at such times, even poultry disposed of, but bees! This question of a really settled home is doubtless one of the primary reasons why bees have not received the attention which they deserve, and which one might very naturally expect them to receive in this sunny land.

An old-time writer remarks that if gentlefolks only knew the pleasure to be derived from keeping pigeons no house would be without its loft. If gentle and simple only knew the pleasure of keeping *bees*, no house would be without its hive.

But bees have *stings*. Bee-keeping would be tame if they had not. The sting introduces an element of risk, a need to be on the alert, an uncertainty as to what will happen next and, last of all, an opportunity of being brave. The first shock of pain is usually followed by a feeling of utter astonishment that one small creature can contain so much venom in its soft little body—what if it were as big as an elephant and venomous in proportion! The bee-books say that the sting has two spears, and each spear has nine barbs. It is rude to contradict, but we have always found them ninety! These fine barbs prevent this miniature harpoon from being easily withdrawn. The first spear darts into the flesh, the other follows, and they penetrate alternately deeper and deeper to the depth of one-twelfth of an inch, the bee books say; but the pain travels further—much! It is also stated that when boiled in water the sting becomes tender and easily crushed. This is interesting information, but poor consolation.

The first thing to do on being stung is to remove the sting. Even Mr. Dick, had Betsy Trotwood asked him, would have agreed with us on this point. Remove the sting first before running away. But how? Not between the finger and thumb, but by wiping it off, and that instantly, before much of the poison can enter the flesh.

Better still is to know how to avoid. Go *quietly*, work *calmly* and, if a beginner, *slowly*; as fast as you like afterwards, but always without flurry. Work calmly, quietly and *fearlessly*. To shrink from a dog is to

encourage it to bite you, to feel afraid is to be stung. Wear a dark veil, fixed securely. If it is bad to have a bee in one's bonnet, it is much worse to have one in one's bee-veil!

In practical bee-keeping there is nothing the beginner will find of greater service than to learn to interpret the various sounds of the bees. To distinguish all would require a sense of hearing keener than that possessed of human ears, but even the dullest ear, after long listening, becomes familiar with many bee-notes, and finds meaning in what to the novice is nothing but a bewildering confusion of sound. We must learn to interpret these various sounds from the everyday happy hum of the bees in the flowers, varying as it does in intensity and eagerness, but expressive always of satisfaction and delight, to the strange "peep-peep" of a princess in her, as yet, unopened cell.

When the weather is warm and honey plentiful each bee leaves the hive with a flourish "Whizz, I am off" sort of exclamation, or is it a hymn of gratitude for a new day and its sunshine?

The noon-day play spell is a living song of gladness—an ariel dance, in which the young bees join and learn the joys of flight; a thorough ventilation and refreshment of the hive, but often a source of consternation and alarm to the beginner in bee-keeping, for he is sure that in all this uproar his bees are swarming or robbing or doing something dreadful, until he discovers it is only play, and that each hive repeats this performance at the same time every day. To the uninitiated the noise is suggestive of swarming, and he watches with some concern until the bees have gone back and the usual quiet is restored.

One of the most interesting sounds is the "call of the queen" or the "call of the home," the sound that when a swarm is being hived leads them up to the entrance in such unerring lines.

All these are sounds that one is glad to hear, but there are unpleasant sounds as well—the sound of the robber, the high, angry note of an enraged bee, the bee that has a grudge against you and is determined instantly to pay it off. A bee "calls out" when it is being captured or hurt, and a queen when she is frightened. Bees annoyed by ants call in distress and spit at their tiny tormentors, like defiant kittens. The wail of a queenless colony is easily known and utterly sad, though most pathetic and pitiful of all is the sound of bees that have lost themselves in the rain or darkness.

We have spectacles and microscopes to aid our eyes, but what of an instrument that would enable our ears to distinguish the delicate sounds of the hive we are at present too deaf to hear!

WEATHER CONDITIONS OF SOUTH AFRICA.

LECTURE BY MR. E.-R. HOBSON AT GRAAFF-REINET.

It is not my intention to give you a scientific meteorological discourse. It would be out of place for a farmer to attempt such, but I will endeavour in my treatment of this subject to bring under review certain observations which I have gathered in the ordinary course of an occupation which is so dependent for its successful prosecution upon conditions of the weather, especially with regard to the rainfall. I have from my childhood been taught to observe the movements of the clouds, the force and direction of the winds; the kind of weather to expect from day to day, and from season to season, following as experience taught, certain atmospheric conditions.

I am aware that scientific subjects are more conveniently discussed in scientific terms, but I trust that I may be able to express myself, without being subjected to serious misapprehension, in the more homely phraseology I am accustomed to.

I feel that some explanation is necessary regarding the heading of my subject, "The Weather Conditions of South Africa." I merely wished to employ a comprehensive title which would as briefly as possible indicate that the scope of our enquiry would include natural laws and the study of certain atmospheric phenomena common to South Africa. To enter into minute details and follow precisely to a logical conclusion a discussion upon every meteorological condition for South Africa would give employment for, not one, but dozens of lectures, and would require investigations and observations conducted scientifically with meteorological instruments and fully-equipped observatories, such as South Africa at the present time does not possess. It would require the work of a lifetime and, above all, it would imply the possession of a scientific knowledge not available upon the present occasion.

Scientific meteorology in South Africa has so far given us no conclusive and reliable work. The late Mr. Gamble's rainfall maps and his writings upon the subject are invaluable, and his observations, founded upon a personal knowledge of the country during a long experience, are reliable. Dr. Alexander Buchan has given us "A Discussion of the Rainfall during the Ten Years 1885-94," but it can hardly be said that either of these eminent meteorologists have completely and satisfactorily explained the causes of meteorological phenomena common to the Southern Hemisphere and more particularly to South Africa. It can hardly be expected that they would. The facilities for careful and accurate observation are wanting. The meteorological conditions of the Southern Hemisphere are different in many essential particulars to that of the Northern, where hitherto the recorded investigations have chiefly been conducted, and from whence our scientific men have necessarily drawn much of their

information and their inspiration. There must be a scientific and, of course an explainable, reason for excessive or partial rainfall; for cycles of heavy rainfall, and cycles of drought; for the appearance of untimely frost; for summer weather in midwinter; for the principles governing the force, direction and continuance or periodic failure of certain well-known aerial currents. In all these matters, I am sorry to say, we have very little guidance. A daily forecast of the weather would also be invaluable for certain more or less populous centres in telegraphic communication with a properly equipped Central Observatory. Such an Observatory is necessary for the whole of South Africa. Political divisions should not be allowed to interfere with the meteorological or other scientific work of the sub-continents. It should be considered as one country.

At present we have a Meteorological Commission at Cape Town, and this, together with the Royal Observatory in the same neighbourhood, constitutes our Central Bureau and Observatory. The more important work of the Meteorological Commission appears to be office routine, the reduction of observers' reports, and the preparation and publishing of an annual report. The Royal Observatory is responsible to the Lords of the Admiralty. Good work is done, and as one of the ordinary public, it is difficult to see how more could be accomplished with the funds available. We are grateful for the services so freely rendered by scientific gentlemen, whose other important duties must of necessity keep them at the capital, but we shall never understand our meteorological conditions and make the most of knowledge which we ought to possess already, until we have a Central Observatory in the Eastern Province, fully equipped in every way, with every arrangement for securing the retirement and uninterrupted routine so necessary for the highest development of observatory work. The Bureau at Cape Town would still be necessary for tabulating information and furnishing reports.

Mr. Hutchins has truly described our position when he says, "A student following up the simplest enquiry has still to face the accumulating raw material of the ill-equipped Meteorological Commission." The object of the present enquiry is to review briefly the climatological conditions of South Africa, from the data and statistics as furnished to us, and therefrom to draw certain deductions, and possibly to venture certain theories. It is very likely that our efforts may be crude and our theories somewhat speculative. We shall adventure this much, and leave it to scientific meteorologists to correct our opinions. The conditions affecting the rainfall of South Africa is our chief concern, and we shall make this the objective of our enquiry.

There are three principal factors to be considered, evaporation, condensation, and precipitation.

With reference to evaporation. Very few observations have been conducted systematically, and hardly any data supplied. There are no considerable bodies of water in the interior of South Africa. They would have to be considerable indeed, with our moderate temperature, to act as vapour-feeders. Our principal source of supply is the great extent of ocean lying to the East of South Africa, and which being so largely within the tropics, produces an enormous amount of vapour, or saturated air; this is carried by the trade winds over South Central Africa. The southern portion, being fortunate in having the warm Agulhas current to supply moisture, which is carried by the Great Southern Anticyclone into the Southern, or more particularly, the South-Eastern portion of South Africa, condensation takes place owing to these comparatively warm moisture-laden winds meeting the land rising into higher altitudes immediately where the colder air and consequent loss of temperature by expansion rapidly produces clouds, and rain follows.

The chain of mountains which follows the contour of our coast, at no very considerable distance from Central Cape Colony to the North-Eastern Transvaal, is one of the most important factors in the production of the rainfall of the Eastern portion of South Africa, and indirectly to other portions of the sub-continent.

The configuration of the land adjacent to the coast line north of the Zambesi, is in a less marked degree possessed of these condensation advantages. It is, however, within the tropics and this and other reasons give it a heavy rainfall. It is from this region, or more correctly speaking, between latitudes 10 and 20 that I believe our northern poleward atmospheric current rises. It is possible at times that it may be moist, but it is more often a hot, dry, N.W. wind which travels southward, and in conjunction with the Indian Ocean winds, gives portions of South Africa a heavier rainfall at times than would otherwise ensue. (I shall endeavour later on, by the aid of an illustration, to explain this.)

According to Professor Ferrel, the great northern poleward current rises in equatorial regions and flows southward. There is another vertical current circulating underneath this in the same way. It rises in the tropics, and is the one generally referred to in this paper as the Northern Wind or Cyclone. It has a west to east trend, and is most severe in the winter, particularly in July and August. As the path of the sun moves southward it also moves south, and is the strong southerly wind noticed in the report of H.M.S. "Challenger."

We have next to consider precipitation or rainfall. In this respect South Africa is divided into two portions. The larger or central and eastern portion is dependent upon summer rainfall chiefly. The other portion is mainly dependent upon its winter rains. This is only a rough division. I will endeavour to show later on that the North-West is dependent for its slight rainfall to the summer rain, and that portions of the southern coast and S.W. participate in both, but in a less degree to the extreme South-West and Eastern portions.

Taking then the summer rainfall which is the most important for the greatest part of South Africa, and taking the month of January as the central summer month, we find that the N.W., including Great and Little Namaqualand on both sides of the Orange River and extending southwards as far as Clanwilliam or Piquetberg, the mean rainfall for the month is ·5, proceeding eastwards the rainfall gradually increases until we reach the East Coast, where it would be 4 inches. If you consulted a rainfall map you would notice that the successive waves from the East Coast became lighter in colour. You would also notice that their western circumference was more or less circular. This latter fact I would call your attention to, for it is important.

The range of mountains which acts as a condenser for the moisture-laden winds from the Indian Ocean lying across their track, and having a great extent of land with an increasing temperature at their back, there should be very little rainfall over the greater part of Central South Africa. The little moisture that would be left over in the eastern and south-eastern winds after they had crossed the mountain ranges would only be sufficient to form occasional clouds which would rapidly evaporate in the dry air of the interior. You will have noticed the banner clouds upon Table Mountain and Bruintjes Hoogte; the never ending evaporation and disappearance of the lee side of these clouds is what would take place on a large scale were it not for the appearance upon the scene periodically of the northern cyclone which sweeps down from the tropics with the return of the sun south of the Equator, and which setting a whirling circulation in motion draws the moisture-laden trade winds from the Indian Ocean within the Colonies lying to leeward of these mountain

ranges. This produces our thunderstorms, often ending in more general rain. For although the current may be violent at one time, the pressure force may become more evenly distributed over very large areas and more general rain follow.

It will be necessary for us now to enquire into the change which has taken place in an atmospheric current which at one time in its course I described as warm and moist, and which (a portion of it at least) I now describe as cold and comparatively dry. In ascending rapidly into higher altitudes this east and south-east wind became colder through contact with colder bodies, by radiation and also by loss of moisture from precipitation. The process is easily understood, and I need not labour it. Another factor has assisted in reducing the temperature, its association with more directly southern winds which not only lowered the temperature by contact but by pressure served to elevate and increase the angle of inclination of what I now call the Eastern or Indian Ocean Cyclone. The N.W. wind, as I have said, is in summer generally hot and dry, and at these altitudes the South-East wind is often cold and comparatively dry. These conditions would not produce rain, and it is only after a great whirling motion is set on foot so that the Indian Ocean current is drawn in that we could have a warm and moist atmospheric current meeting and mixing with a colder and comparatively lower that we would have conditions favourable to the production of clouds. Other causes would further serve to lower the temperature and produce rain. It is a well-known fact that when saturated warm air is mixed with unsaturated cold air, condensation takes place much more easily than when saturated cool air is mixed with unsaturated warm air. This air mixture process, as I have said, is more productive of clouds than rain. A good illustration of this is to be seen if the door of a laundry is opened on a cold day. A steam or fog instantly appears; on the other hand, if you were to open the door of an ice house, scarcely anything would be noticeable.

The Cyclonic or Rotary Wind Theory.

About five years ago, I read a paper before the Z.R.F.A., "Observations about Rain," in which I advanced two theories: (1st) That nearly all the vapour or water which formed our rain came from the Indian Ocean; (2nd), that our strong winds were cyclonic in form and action. I arrived at these conclusions from personal observation of the form and movements of clouds. I had no opportunity for consulting scientific works, and I have had very little since, but from brief references on the subject, which I have been able to gather in the shape of scraps which come my way occasionally, I am glad to say that the views I then gave expression to do not appear to be wholly opposed to the latest scientific theories of atmospheric motion. The great primary atmospheric currents, whether horizontal or vertical, are known to be rotary and axial, although the axes are, of course, constantly changing, and the circumference is, from great inequalities in temperature and pressure, nearly always elliptical. The area of disturbance is enormous, and again, owing to inequalities of temperature and pressure, one side may press upon the earth, and the circumference opposite may be at a very great altitude, the lowering of the temperature along any portion of the circumference will serve to retard the velocity, and there will be a consequent change of axis, or it may serve to create separate whirls, or eddies. It thus often happens in the north-west to south-east winds which I consider cyclonic that at nightfall it apparently ceases, although it may re-commence next day. It must be remembered that with reference to this particular cyclone, the eastern circumference will feel the approach of nightfall long before the western, and thus the temporary stoppage may appear sudden.

These questions will not be satisfactorily answered from South Africa until we have better equipped meteorological stations, with a central Observatory better situated geographically than our present Meteorological Bureau.* It will be necessary not only to gauge the force direction and pressure near the earth's surface of these winds, but these forces must be measured or scientifically deduced for the higher altitudes. Once the fact of general cyclonic or rotary motion is established for our more important atmospheric currents there are many important meteorological phenomena explainable from known natural laws which accompany these. For instance, in the movements of what are known as cyclones, in the restricted sense, we know that the relative humidity increases with the approach towards the centre and the probability of rainfall increases in the same direction.

In the Northern Hemisphere, particularly in Europe, cyclones usually advance from south-west to north-east, and that part of the storm which may be said to correspond to the Anticyclone (the north-east side of the outer circumference) is generally marked by heavy rainfall. Cyclones generally travel with the prevailing wind, and in the Southern Hemisphere are opposite to the movement in the Northern. Thus in a cyclonic wind (as I consider the heavy north-west storms to be), there should be rain at the central area, and also along the south-west circumference. We have very few opportunities in South Africa of judging these movements from the data supplied by scientific observers, but I may here mention an instance which came under my own observation about eleven years ago.

You may possibly remember the festivities in connection with the 60th anniversary of Queen Victoria's ascension to the throne. Great preparations had been made throughout the British portion of South Africa for celebrating the event. When the day arrived we had here at Graaff-Reinet a record hurricane. There was no rain in that part of the storm which swept over Victoria West, Graaff-Reinet, Somerset East, and, I believe, a few more easterly and inland towns. I remember reading telegrams next day saying that there had been a slight rainfall at Kimberley, which I should consider as partly within the inner area. It would be interesting to know exactly the state of the weather at Bloemfontein and Pretoria upon that day. On the outside ring or circumference of the cyclone, or within the anticyclone, there was heavy rain. The illuminations at Cape Town were either spoilt or had to be abandoned. Port Elizabeth had rain, and Grahamstown also in a less degree. For these notes I have had to charge my memory, but as the occasion was a particular one, no doubt records may have been kept, and would be useful if an inquiry were made.

We have not time now to enter fully into all the causes of atmospheric circulation. I may briefly state that as far as we are concerned there is in the Southern Hemisphere an upper southward and an under northward atmospheric current, and that owing to the diurnal rotation of the earth upon its axis, the upper poleward current is deflected towards the east and the lower or equatorial current is deflected towards the west, giving us our northwest and south-east winds. These winds have at first vertical circulation, but from inequalities of pressure from differences of temperature and other causes a twisting movement takes place, and they have again horizontal circulation. Thus we may have winds which from their primary cause were describing more or less vertical action, later on, owing to the movement of the earth upon its axis, following horizontal

* I am aware that we have a good "First Order" Observatory at Kenilworth, near Kimberley, under the able direction of Mr. Sutton, but we require a Central Observatory in the Eastern Province to take careful observations with reference to the meteorological conditions which produce our summer rains.

rotary action. The shifting of the axis of any cyclonic atmospheric current, owing to inequalities of temperature and pressure, may convert a wind which at first was N.W. to W. and S.E. to S.W. We have also to remember that owing to the excess of land in the Northern Hemisphere over that in the Southern, horizontal surface winds would have greater velocities in the Southern Hemisphere, because friction would be less.

It may seem strange at first sight that the effect of the earth's rotation would produce apparently opposite effects upon the Northward Southern current and the Southward equatorial current. I think a quotation from Professor Waldo will explain this in fewest words:—

"The force arising from this rotation will make itself felt by causing the free moving atmosphere to turn to the right of its course in the Northern Hemisphere and to the left in the Southern Hemisphere; and if the air is not free to move in this direction then it presses in this direction, and causes an atmospheric gradient. This force, then, causes the upper poleward current to be deflected towards the East in both hemispheres and the lower equatorial current to be deflected towards the West. There thus arise contrary motions of the air; towards the West near the ground and towards the East at higher altitudes, thus forming *relative* velocities between the strata. If the force were impulsive, the friction of the layers would destroy their relative velocities, and a common absolute velocity below and aloft at any parallel would result. But as the deflection force is constant in action the relative velocities are maintained in spite of friction."

We will now return to our old friend the Northern cyclone. The Trade winds of the Indian Ocean would carry into South Central Africa large quantities of warm, moist air, much of it would be precipitated in a region where, owing to forests and other condensing features, there would be a heavy rainfall. Some of it would rise as warm, saturated air and be carried southward by the poleward current, but most of this air as it rises into higher altitudes would part with much of its moisture, and as it descends towards the earth by pressure from the higher layers of the southward current this wind (the N.W.) is likely to be dry and (in summer) hot, but when it meets the S.E. current it will later on start a whirling movement, drawing in the Indian Ocean wind, and the current will be warm and moist. The annual return of the sun south of the Equator would, of course, regulate the degree and extent southwards of this current. The action of the S.E. winds in meeting the N.W. appears to me to cause these originally vertical currents to whirl upon a horizontal plane. Of course, the area is enormous, and the difficulties in conducting satisfactory investigations are very great indeed. I will, however, give *an illustration*, which may perhaps serve to indicate what appears to me to have been one of these atmospheric whirls:—

The winter of 1903 had been exceptionally dry, and we here in Cape Colony were anxiously looking out for rain. On the 16th of September I noticed that a very strong south-east wind had sprung up. As the wind blew continuously day and night for three days, I telegraphed to Mr. Edgar Evans, at Potchefstroom, asking him to inform me of the state of the weather there. He very kindly replied on the 23rd, giving his notes for the week, which I will take the liberty of quoting here:—"The southeaster you report on 16th, 17th, and 18th arrived from N.E. at Potchefstroom on the evening of the 19th. The weather here for the several days from the 16th was as follows: September 16th, 17th, and 18th: Strong N.W. winds. 19th: Gentle southerly breeze and mostly calm and clear. N.E. wind rose strong about 9 p.m., and continued all night. 20th: N.E. hurricane all day and all night. 21st: N.E. Stiff all day and all night, with thunder and rain for first time since dry winter months. 22nd: N.E stiff, with showers; veered to N.W. at midday, and gradually subsided tc calm in evening.

"The above is the history of the wave of N.E. (*i.e.*, S.E. Trade deflected), which appears to have prevailed from S.E. with you on 16th, 17th, and 18th, and here on 20th, 21st, and 22nd from N.E. Rains are reported from Delagoa, Natal, O.R.C., Transvaal, and Cape Colony during this wave of Indian Ocean wind, and since these reports of the first rains in above places coincide with the first wave of Indian Ocean (S.E. Trade) wind of the season, the connection is undoubted, and proves that the Indian Ocean, not the Atlantic, is the source of the summer rainfall."

It remains to me to add that in the Cape Colony we had on the evening of the 18th a slight S.E. drizzle, which continued all night. On the 19th, about midday, heavy thunderstorms brove over the Central and South-east Karroo.

Mr. Evans, in my opinion, is quite right in ascribing the rainfall to an atmospheric wave from the Indian Ocean. The only difference in my present position is that I ascribe the forces at work as chiefly due to an atmospheric whirl caused by the Northern cyclone or N.W. wind meeting the Southern Anticyclone upon a plane when horizontal motion set in; a whirl was created, and the N.E. or Indian Ocean wind was drawn in. The N.W. wind is more often dry and hot than moist and warm. This is largely due to the fact that it originally was a vertical current, and air in rising parts with much of its moisture. It is fortunate for us then that this whirling motion sometimes draws in the Indian Ocean more or less saturated air. The process of condensation by air mixtures of different temperatures is productive more often of clouds than rain. It is the further sudden lowering of temperature and other forces which come into operation after clouds are formed which is productive in the greater degree of rain. But, of course, we must first have clouds before we can have rain. When I treat with cloud formation and cloud movements later on I shall try to further explain this.

As will be seen in the above illustration, the N.W. current ultimately prevailed, as the forces which produced it are constant at that time of the year. It will be seen that in the Transvaal and Cape Colony the N.W. was the final wind. Of course, the whirl was not stationary, but moving Southwards.

When there is an absence of pressure, or force, a contraction of the cyclone from the Indian Ocean side, westerly (veering round to S.W.) surface winds blow, with more or less violence. This is particularly the case in winter.

I now come to what I call my second proposition, viz.: That when the Anticyclone is cool and moist (generally in the summer) and is suddenly elevated into a mass of warm air, condensation takes place, and rain often follows. This may seem at first contradictory to the ice-house illustration, but it is not so in reality. The air from an ice-house is not moist; if there had been any moisture it would have been converted into ice. In the same way the cold air which passes over our mountain tops and elevated tablelands is more often cold and dry than cool and moist. The action on the lee side of "banner clouds" is quiet and regular; there is no sudden elevation into warm masses of air. Yet it is possible for conditions to prevail occasionally when even at an elevation of 2,500 feet (the height above sea level of much of the Karroo) we could have cool, moist winds, such, for instance, as may happen when for two or three days a moist sea breeze has been blowing, bringing with it or causing fog, or what are more commonly known as mist clouds, suddenly meeting or being precipitated into a mass of warm air, when thunder clouds will form as the mist clouds clear away, and rain often follows. It will be seen that some active agency must be on foot to suddenly raise this mass of cool, moist air, because ordinary radiation on the upper surface of these "mist clouds" would serve to dissipate them as rapidly as they formed, or nearly so. It is here that

some force which we do not yet understand sometimes carries the moist air rapidly upwards into warm air, and thunderclouds form. I think part of this force is in the form of cyclonic currents formed from unequally heated areas of atmosphere of different degrees of moisture. When these cyclones are formed they will travel with the prevailing upper current, that is, N.W. to S.E. If you watch the summer cumuli formed under these conditions you cannot help thinking that there are ascending and descending currents, and certain rotary motion. The clouds rapidly form and expand from inwards outwardly. The outside upper portion has a firm and more or less circular outline. The base is, of course, fairly straight and horizontal. Unless there are upward currents of considerable force to support these apparently dense and heavy masses, it is difficult to understand how they could remain, and also for the excessive rainfall which sometimes takes place in these storms.

Thunderclouds sometimes attain very great depth or height, and it is when they do so that hailstorms are more frequent. These generally take place, too, on the hottest days, when, the air being raised, it is thin or rare, and allows for the clouds to rise rapidly to great heights and form. I have seen thunderclouds (to use homely language) "topple over," and rain, or more frequently, hail with lightning and thunder, takes place a mile away from the base of the original cloud.

It may be said that with all the conditions for rain production which I have described we should have rain much more frequently than we do. It must be remembered, however, that there are circumstances required to work concurrently to bring about this happy consummation, and more often than not one or other is missing. Then, again, the rarity of our lovely atmosphere at the great height above sea level which prevails over a large portion of the sub-continent is not favourable to vapour conduction, and our air is more often dry than moist.

Cloud Formation.

To quote from an Encyclopædia: "Clouds are masses of fog, consisting of minute particles of water, often in a frozen state, floating in the atmosphere. When air has its temperature lowered below saturation point, either by ascending and becoming rarer, or by meeting a colder current, a portion of the vapour loses its gaseous form and becomes condensed into minute specks of water. It has been shown by Dr. Aitken that this condensation always takes place round a small particle of dust. A cloud, therefore, does not consist of vapour in the proper sense of the word, but of very small drops of water. How this water-dust is suspended in the atmosphere—why the particles do not descend as soon as formed, has never been satisfactorily explained. Professor Stokes holds that the rate of fall is rendered exceedingly slow by the friction and drag of the air particles, just as fine particles remain suspended for a long time in liquids of much less specific gravity than themselves. Besides, as Sir John Herschel says, ascending air currents also oppose the fall of clouds, for the air may be ascending faster than the particles of the cloud are falling through it; while at night, in the absence of rising currents, clouds often descend to and dissolve in lower and warmer levels."

The different altitudes at which different forms of clouds are generally found are for the lower layer from 2,000 to 4,000 feet; the middle layer 12,000 to 14,000 feet, and high clouds at 20,000 to 27,000 feet. If we commence at the top or highest layer we will find what is commonly known as *cirrus* clouds, sometimes called "mares' tails," etc. These are probably minute particles of ice. The *cumulus* or summer thunder clouds are probably from ten to twelve thousand feet in our atmosphere, perhaps

even lower at times. Nearer the earth's surface will be found what we here commonly call "mist clouds." There are many different varieties of the above, and many different forms, which it would be impossible to relegate to either one or other of these three principal forms. If you carefully note under just what conditions these clouds are formed you can always tell the most active agency in their formation, and it would be comparatively easy to tell in which direction they would move, and whether they are likely to be productive of rain or not.

Ground fog, of course, rests upon the earth, and as it rises forms "mist clouds," if the conditions are favourable; if not, it may be dissolved and become invisible vapour.

I believe that in the case of the formation of our thunder clouds there exists a supporting power given by upward air current, and that is why I look upon the South-east under current, or what I call the Anticyclone, as one of the most important factors in the production of our rainfall.

If you watch the formation of a thunderstorm you will often notice small and frequent spiral columns of dust, called whirlwinds or "sand devils," travelling towards the storm. They are merely eddies from larger air currents, but which are not so plainly visible. In watching the approach of a thunderstorm you will often see a duststorm going before it. This is caused by the pressure of the wall of descending rain. You will notice, too, that as it gets away from the immediate neighbourhood in front of the storm the dust rises and, I believe, often assists in the formation of other clouds in advance, which are attracted to and feed the mass of the original cloud. With these favourable conditions, a storm will go on increasing, although it may be precipitating a very considerable amount of water. A state of super-saturation does, I believe, sometimes occur in our clear air. I have seen clouds produced in an absolutely clear sky when grass fires have been lit.

I have little sympathy with or interest in the movement in certain quarters for so-called rain production by concussion. So far these attempts have proved futile. And when one considers how insignificant the explosion of even a considerable quantity of dynamite or gunpowder is when compared with the electrical discharges of "Heaven's artillery," it seems to me these attempts will be productive of very little good. Apart from this, we are bound to respect the present feeling of a large number of our fellow-Colonists. An inquiry into the natural laws of meteorology will, I feel sure, be to them quite a different matter.

The Desiccation Theory.

Much has been said about the desiccation of South Africa, and countries which at one time in the world's history were known to have enjoyed a more humid climate, but which have now apparently a decreasing rainfall, are cited as instances, of which our own is likely to form a parallel, such as portions of the Sahara, Palestine, and Turkestan. I am bound to say, however, that with reference to the countries mentioned, the great inland seas or lakes supposed to have existed must have belonged to a prehistoric age, and the desiccation which is believed to have since taken place cannot be proved. It is more likely that gradual upheavals have displaced the former seas of the Sahara. Natural desiccation has been slow indeed. The ancient Egyptians are considered of fairly hoary antiquity, and they made no mention of the inland seas. Undoubtedly the desert has during 6,000 years encroached upon their western boundary. Geologists tell us that the Dead Sea at one time was covered to a depth of 1,200 feet above its present level, but this would have flooded cities mentioned in the time of Abraham and Lot, the ruins of which are still believed to be extant. The spreading march of existing deserts during all this time has been slow,

though sure, but its rate of progression, unless much accelerated, need not cause us any great uneasiness. Our own history is of comparatively recent origin. The meteorological conditions during that time have not changed much. Travellers and others tell us that droughts and rain alternated one hundred years ago in just the same state of delightful irregularity and uncertainty.

Man's Influence on the Climatology

of any country is undoubtedly considerable, and the desolating wars and the destruction of forests and cultivation which took place in ancient Egypt and Palestine, no doubt, helped to convert a fruitful country into barren wastes and lead the way for inroads of the desert.

It is just in this connection we have cause to consider what influence we ourselves bring to bear on the climate of one of the finest countries in the world.

I do not particularly refer to the comparatively moderate desolation of our own recent wars, but it is chiefly in the pursuit of our industrial enterprises that I am afraid we are not assisting the natural agencies which help to produce rain.

Consider for a moment the destruction of forest and other trees. The slopes of our mountain ranges are being denuded to provide fencing poles and timber for the mines; wood is our most common fuel; grass fires are allowed to devastate great tracts of country, often destroying thousands of shade trees as well. Think, too, of our system of grazing. Words fail one to describe the mischief that is done to vegetation, and when we compare, on the other hand, the puny attempts at tree-planting and cultivation, there is little wonder that the rainfall may be less and that droughts, when they come, are more acutely felt.

ANIMAL DISEASES—CONTAGIOUS AND INFECTIOUS.

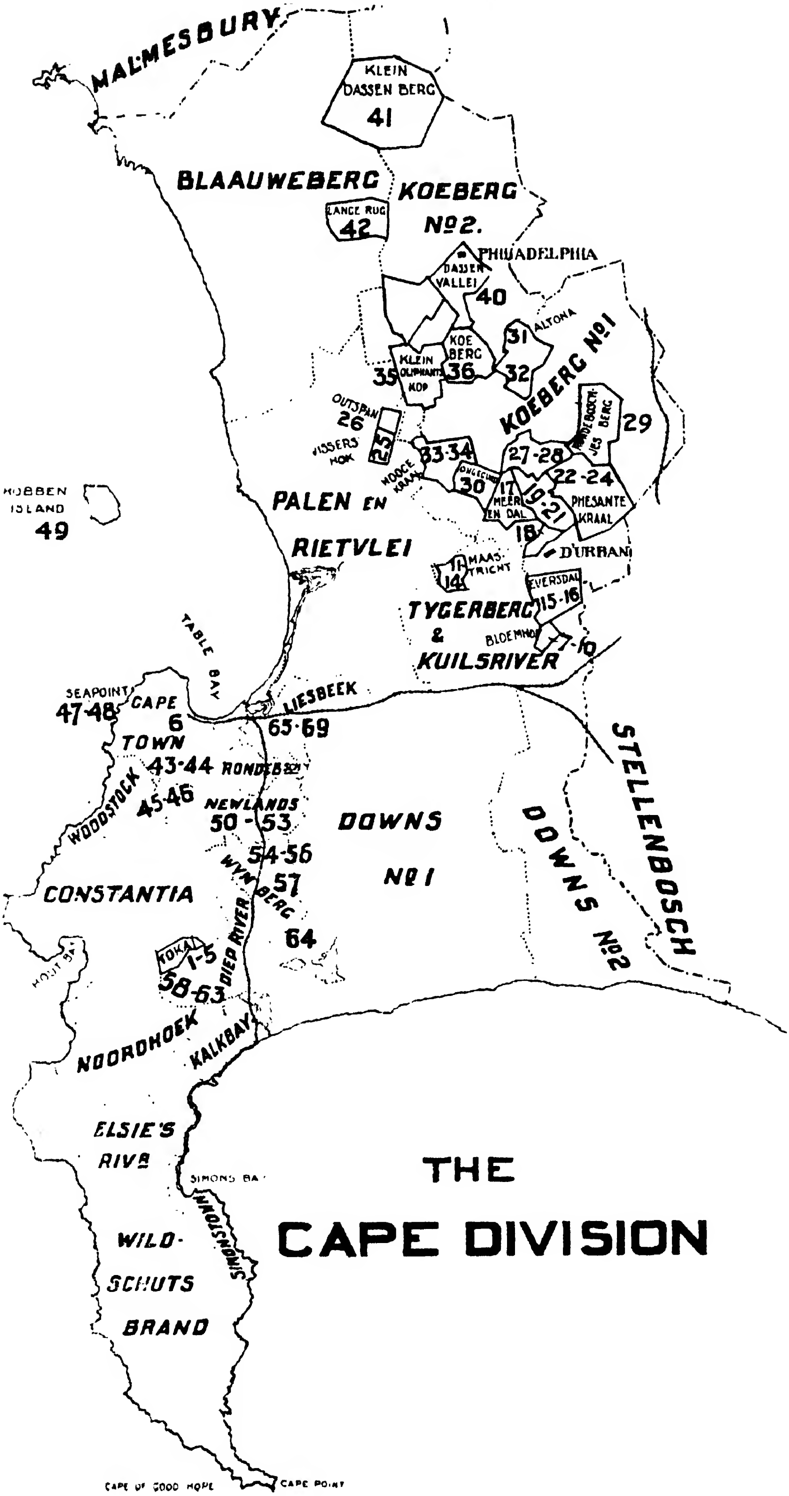
Summary of Outbreaks of Contagious and Infectious Animal Diseases Scheduled under Act No. 27 of 1893.

Still under Quarantine on 31st August, 1908.

District.	Anthrax.	Epizootic Lymphangitis.	Glanders.	Lungsickness.	Redwater.	Scabies (Equine).	Sponsziekte.	Tuberculosis.	Totals.
Alexandria	...	...	1	...	...	...	2	...	3
Cape	...	...	...	...	...	...	...	1	1
East London	...	...	...	5	...	...	7	...	12
Gordonia	...	...	...	3	...	...	...	...	3
Herschel	...	...	...	...	...	...	2	...	2
Humansdorp	...	2	...	...	2	4	6	...	14
Kimberley	...	...	...	...	...	...	1	...	1
King William's Town	...	...	...	10	...	...	4	...	14
Komgha	2	...	...	4	...	...	1	...	7
Mafeking	...	...	...	...	...	...	2	...	2
Peddie	...	...	...	1	...	...	...	...	1
Port Elizabeth	...	...	...	...	...	1	...	...	1
Queenstown	...	...	...	...	...	...	5	...	5
Stockenstrom	...	...	...	...	...	...	1	...	1
Stutterheim	...	...	...	2	...	...	...	...	2
Vryburg	...	...	...	1	...	...	...	...	1
Tembuland.									
Elliotdale	...	...	...	1	...	...	...	...	1
Engcobo	...	...	...	20	...	...	...	...	20
Mqanduli	...	...	...	26	...	...	1	...	27
St. Mark's	...	...	1	3	3	...	5	...	12
Umtata	...	...	...	15	...	...	...	...	15
Transkei.									
Butterworth	2	...	..	13	1	...	1	...	17
Idutywa	...	...	...	2	...	...	1	...	3
Kentani	2	...	...	27	...	...	11	...	40
Nqamakwe	...	...	...	17	...	2	3	...	22
Port St. John's	...	...	...	1	...	...	...	...	1
Tsomo	...	...	...	7	3	...	...	...	10
Willowvale	...	...	...	11	...	...	1	...	12
Pondoland.									
Libode	...	...	...	3	...	...	...	...	3
Flagstaff	...	...	...	1	...	...	...	...	1
Lusikisiki	...	...	...	2	...	...	...	...	2
Ngqeleni	...	...	...	8	...	...	...	...	8
Tabankulu	...	...	...	26	...	...	...	...	26
East Griqualand.									
Mount Ayliff	...	...	...	2	...	...	...	...	2
Mount Frere	...	...	...	12	...	...	...	...	12
Qumbu...	...	...	...	25	...	...	...	...	25
Tsolo	...	...	...	38	...	...	...	...	38
Umzimkulu	...	...	...	...	...	...	2	...	2
Totals	6	2	2	286	9	7	56	1	369

J. D. BORTHWICK, Chief Veterinary Surgeon.

Office of the Chief Veterinary Surgeon,
Cape Town, 3rd October, 1908.


MALMESBURY
KLEIN DASSEN BERG
41
BLAAUWEBERG
LANGE RUG
42
KOEBERG No 2.
PHILADELPHIA
DASSEN VALLEI
40
ALTONA
31
32
KOEBERG No 1
KOE BERG
36
KLEIN OLIPHANTS KOP
35
OUTSPAN
26
25
VISSERS HOK
33-34
30
17
MEER EN DAL
18
19-21
27-28
22-24
PHESANTE KRAAL
29
DURBAN
ISLAND
49
PALEN EN RIETVLEI
MAAS-TRICHT
14
EVERSDAL
15-16
TYGERBERG & KUILSRIVER
BLOEMHOF
7-10
TABLE BAY
SEAPOINT
47-48
CAPE TOWN
6
LIESBEEK
65-69
43-44
WOODSTOCK
45-46
NEWLANDS
50-53
54-56
57
WYNBERG
DOWNS No 1
DOWNS No 2
STELLENBOSCH
CONSTANTIA
TOKAI
1-5
58-63
DIEP RIVER
64
NOORDHOEK
KALKBAY
ELSIE'S RIVE
SIMONS BAY
SIMONSTOWN
WILD-SCHUTS BRAND
CAPE OF GOOD HOPE
CAPE POINT
THE CAPE DIVISION

THE AGRICULTURAL SOILS OF CAPE COLONY.

INVESTIGATION AND ANALYSES.

By C. F. JURITZ, M.A., D.Sc., F.I.C., Senior Government Analyst.

(Continued from Page 335.)

CATHCART.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	No. 3.	The Dales.	St. C. O. Sinclair.
2.	,,	,,	,,
3.	,,	Exwell Park.	,,
4.	,,	,,	,,
5.	,,	,,	,,
6.	,,	,,	,,
7.	,,	,,	,,
8.	,,	,,	,,
9.	No. 4.	Spanover.	,,
10.	,,	,,	,,
11.	,,	Side Spur.	,,
12.	,,	Anta.	,,
13.	,,	,,	,,
14.	,,	,,	,,
15.	,,	Braemar.	,,
16.	,,	,,	,,
17.	No. 5.	Stoneridge.	,,
18.	,,	,,	,,
19.	,,	,,	,,
20.	,,	,,	,,
21.	No. 4.	Inverthorn.	,,
22.	,,	Blackpool.	,,
23.	,,	,,	,,
24.	,,	,,	,,
25.	No. 6.	Sledmere.	,,
26.	,,	,,	,,
27.	,,	,,	,,
28.	,,	Clapton.	,,

As stated on page 36, the investigation of the soils of the Western Province had not progressed very far ere requests began to come in from the east for similar investigations in that portion of the Colony. It was in response to such requests that Cathcart and the neighbouring districts were visited. It had, therefore to be borne in mind, in taking samples in the Cathcart Division, that, although it was the intention that the analyses of these samples should form part of the systematic investigation of the Colony's soils, yet this area was being surveyed at the special request of the Eastern Province Fruit-growers' Association. It was found expedient, therefore, to concede, to a greater extent, at any rate, than would otherwise have been the case, to the wishes of the individual farmers of the district in visiting special localities, and in taking samples from places selected by them. At the same time, samples representative of the different types of soil occurring in the Division were also collected.

The soil of the Cathcart Division, compared with that of Komgha, which will be dealt with subsequently, is not so micaceous, but is, on the other hand, more calcareous. Dolerite, although largely present, does not appear as plentiful as in the Komgha Division. The Cathcart soils seem to be naturally derived from the upper rocks of the Karroo system.

No. 1, a sample of black loamy valley soil, was collected from the farm The Dales. It appears to extend to a depth of about eighteen inches, and rests on a subsoil of yellow clay. The veld on both sides of this valley is reported to be "sweet." No. 2 represents the hill-side soil of the same locality. These two soils, together with Nos. 17, 18, 19 and 20, are representative of the area known as the Bontebok Vlakte—the chief grain-producing portion of the Cathcart Division, and stretching over practically the whole of its south-eastern part.

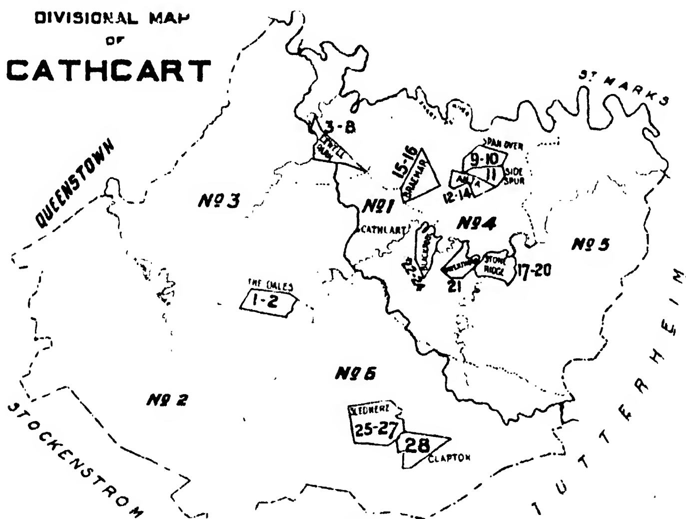
Nos. 3 to 8 were collected on the farm Exwell Park. Above the homestead is a valley whence samples 3 and 4 were taken: as it was intended to use this land for an orchard, those samples were taken from the mixed contents of holes about 22 inches deep in each case. By thus departing from the usual method of soil-collecting already detailed, a better idea of the suitability of the soil for orchard purposes would be obtained. Physically No. 4 differs from No. 3 in being slightly more clayey. No. 5, a sample of clayey soil rich in organic matter, was taken from ploughed land just above a lately constructed dam. The subsoil here was of a more sandy nature. The soil represented by this sample is capable of retaining a large amount of water, due to the proportion of clay and organic matter present therein. No. 6 represents a mixture of surface and subsoil from the patch just referred to. No. 7 is a black soil taken from lands below the homestead and adjacent to the railway line. No. 8, which is also a black soil, represents the soil of the Victoria Orchard. This land had been in constant use for some years, and was reported to be very fertile, mealies, oats, and wheat being amongst the crops successfully borne during the last three years. These six soils represent the eastern portion of the Waku valley, the main fruit-producing area of the Cathcart Division. The soils of this part of the country contain a large amount of calcium carbonate, which is visible in the form of "drip lime."

No. 19, taken from the farm Stoneridge, represents the valley soil lying between the homestead on that farm and the Thomas River. No. 18 is representative of the hill-side soil near the homestead. No. 17 was taken from cultivated land on the same farm for the purpose of comparison with Nos. 18 and 19: the land from which it was taken had borne oats and mealies and, to judge from the analytical figures, cultivation had left its mark in a diminution of the stock of available phosphoric oxide. It was intended to utilise this soil for grain, but in that event

it would obviously stand in great need of a phosphatic fertiliser.* No. 20 was taken from a sandy soil situated behind the homestead and proposed to be used as a vineyard, a purpose for which it did not appear unsuited: it proved to be rather poorly supplied with phosphates.

No. 21 was collected, on the farm Inverthorn, from one of the older river terraces of the Thomas River. No. 22, a sample of black soil, was taken on the farm Blackpool, just below a ridge of doleritic boulders on the slope towards the Thomas River. The subsoil was reported to be a clay. No. 23 was taken from the same slope, but beyond the influence of the doleritic ridge. it is a more sandy soil, lighter in colour than No. 22. It was stated that barley and rye did not thrive on the lands represented by it. No. 24 is a sample of doleritic soil lying further to the east.

On the farm Spanover two samples were taken, one, No. 9, representing the garden soil lying south-west of the homestead, and another, No. 10, the grain soil north-east of the latter. No. 11 was a stiff black soil, representing a very productive tract of land whereon potatoes especially were reported to do well. The soil No. 12, collected on Mr. W. H. Crout's farm Anta, was of a sandy character, and intended to be devoted to the cultivation of potatoes. No. 13, from the same farm, represents a rather stiff alluvial soil of good depth. No. 14 was taken from the same slope, but nearer to the river; the soil here is dark in colour and of a more clayey nature than where No. 13 was collected. No. 25 is a sample of



soil from cultivated land just below the homestead at Sledmere. The subsoil at this place was found to be a yellowish clay, while the surrounding surface soil is inclined to be sandy. No. 26 was taken from the same land, but nearer to the bottom of the slope. No. 27, a soil rich in organic matter, was taken at the bottom of the slope whence the previous two samples were collected. The portions of this slope represented by these three soils differ considerably in their productiveness when used for the same purpose. On the area represented by the last-mentioned sample, wheat, for instance, does not seem to thrive. No. 28 was collected on the farm Clapton. It is a stiff black soil, lying near to the homestead, in

*Cf. Prof. MacOwan's remarks relative to lack of phosphates in grain soils at Durbanville, quoted on page 334.

the vicinity of which doleritic boulders were noticed. This soil, together with No. 19, typify the N.N.E. portion of the Division. Cattle are said to be in the habit of licking the watercourses in this portion of the district. This fact was thought to be due to the presence of a considerable amount of common salt in the soil; attention was not drawn to this when passing through any other part of the Division, it may, nevertheless, be the case that such a habit is prevalent throughout a much wider area, and not peculiar to the stock in the parts where it was specially noticed.

Samples 15 and 16 are dark valley soils from the farm Braemar, which lies north-east of Cathcart. The latter is the more clayey of the two. On the lands represented by these samples mealies were reported to do well.

The following analytical figures were obtained:—

(Method I.)

	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	99·0	1·50	3·77	·0244	·098	·200	·033	·040
2.	98·8	·62	1·84	·0145	·053	·014	·014	·015
3.	96·5	1·36	2·30	·0376	·070	·059	·066	·025
4.	97·1	1·52	2·99	·0334	·084	·111	·099	·038
5.	99·4	2·78	5·82	·0731	·126	·446	·172	·088
6.	99·4	2·68	5·24	·0341	·112	·295	·188	·060
7.	99·0	2·30	5·12	·0341	·112	·151	·179	·082
8.	99·3	2·70	5·88	·0721	·171	·358	·208	·128
9.	98·0	1·48	3·29	·0060	·081	·330	·121	·031
10.	93·6	1·53	3·97	·0287	·084	·162	·122	·026
11.	96·0	1·29	3·20	·0028	·133	·128	·095	·036
12.	99·0	·55	1·90	·0025	·070	·124	·162	·028
13.	99·3	·70	2·40	·0129	·084	·088	·070	·017
14.	98·8	·85	2·56	·0042	·105	·098	·078	·023
15.	99·0	1·12	3·06	·0240	·140	·054	·067	·031
16.	98·9	1·19	3·59	·0042	·133	·070	·042	·026
17.	97·6	1·60	3·35	·0325	·076	·274	·057	·018
18.	94·9	1·39	3·07	·0290	·090	·142	·070	·031
19.	98·1	1·06	2·85	·0268	·076	·152	·066	·033
20.	97·2	1·18	3·30	·0275	·056	·142	·080	·028
21.	97·7	1·13	3·05	·0197	·056	·126	·090	·027
22.	98·7	2·73	5·55	·0057	·182	·290	·175	·075
23.	97·0	·65	1·76	·0050	·028	·072	·137	·029
24.	94·8	1·87	4·72	·0176	·140	·086	·102	·033
25.	99·0	1·10	3·34	·0046	·112	·124	·160	·022
26.	97·4	1·50	3·99	·0042	·119	·116	·124	·024
27.	98·6	2·65	4·98	·0042	·091	·148	·126	·035
28.	97·3	2·57	7·60	·0127	·154	·252	·139	·040

On the whole, the plant food content in these Cathcart Division soils is more satisfactory than in the neighbouring Division of Komgha: taken all round, they possess a fair amount of available lime and potash, but the soils, which are all more or less of a clayey nature, exhibit decided poverty in respect of phosphates, if judged by European and American standards, although in this connection a remark already made must be borne in mind,* namely, that proportions of phosphoric oxide which

*See page 45 of this Vol.

would be deemed inadequate in Europe, in this Colony frequently suffice to yield satisfactory returns. There appears to be generally a larger amount of chlorides present in these soils than that found in the Western Province soils.

In the soils of Field-cornetcy No. 3 phosphoric oxide averages better than in the rest of the Division. Of this entire series Nos. 2 and 15 are the worst; they show an all-round deficiency. The poorest soils in the Division, from a chemical point of view, are those which represent the Bontebok Vlakte: Nos. 2 and 15 have just been referred to; Nos. 1 and 16 lack potash and phosphoric oxide, and Nos. 17 and 18 are also badly supplied with phosphates.

The fertile soil of the Victoria orchard had not received any manure for three years; it is one of the best all-round soils met with in the course of these investigations. In every respect its available plant food is satisfactory: its nitrogen is good, the lime is normal in amount, and so is the potash and phosphoric oxide.

One of the sandier soils of the Division, No. 23, which represented part of the incline towards the Thomas River on the farm Blackpool, proved to be poor in nitrogen, lime, and phosphoric oxide, with but a moderate amount of potash; the failure of the barley and rye crops is thus explained, and here once more the analytical results bear out practical experience. The extent of doleritic soil to the east of this contains a larger proportion of organic matter and more nitrogen, but less potash, and is practically just as badly off for lime and phosphates. The productive potato lands represented by sample 11 are evidently fairly well supplied with lime and potash, and also show a satisfactory nitrogen content, but phosphoric oxide is low in amount. If potatoes be constantly grown on this land, its reserve of potash, unless renewed artificially, would suffer speedy exhaustion.

CERES.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Ceres.	Riet Vallei.	Dr. R J Reinecke.
2.	,,	,,	,,
3.	,,	,,	,,
4.	,,	,,	,,
5.	Bokkeveld.	The Oaks.	O. A. Ohlsson.
6.	,,	,,	,,
7.	,,	,,	,,

Four samples of virgin soil were collected on the farm Riet Vallei, in the outskirts of Ceres village, about half a mile east of the Dwars River. At the particular places where the samples were taken, the soil had never been cultivated or manured, and is overgrown with sour grass. The surface soil is sandy and the subsoil clayey. In the locality in question soil of this type, if well manured, is stated to have been found capable of the most liberal cultivation: vines and tobacco do well; without manure lucerne does not thrive, nor can one be surprised at this, considering the poor supply of lime in the soil.

Three analyses were made of soil from Mr. A. Ohlsson's farm The Oaks: No. 5 represents ground that had been trenched, and No. 6 was a mixture of soil collected on two different parts of the farm.

The table below gives the results of the chemical analyses of the above soils: —

(Method I.)

	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide
1.	97·0	·36	1·93	·0049	·077	·072	·015	·022
2.	80·7	·37	1·86	·0130	·091	·010	·015	·028
3.	98·3	·27	1·41	·0067	·084	·010	·012	·010
4.	98·0	·56	2·55	·0123	·112	·008	·017	·032
5.	80·5	1·33	5·48	·039	·102	·052	·024	·040
6.	80·2	·98	4·28	·019	·074	·034	·025	·041
7.	94·2	·64	2·81	·014	·074	·042	·020	·052

The areas represented by these soils are largely influenced by the presence of rocks of the Table Mountain series, and the first four, in particular, lying in a tract of country practically surrounded by sandstone mountains, can hardly be expected to be otherwise than poor in the chemical constituents of plant food.

CLANWILLIAM.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Bidouw.	Matjes Rivier.	P. Bornemisza.
2.	,,	,,	Dr. Simon.
3.	,,	Wupperthal.	P. Bornemisza.
4.	,,	Beukes Kraal.	,,
5.	,,	,,	Dr. Simon.
6	,,	Kromme Rivier.	,,
7.	,,	,,	P. Bornemisza.

In this Division soils were collected from farms in the Bidouw Field Cornetcy, where tobacco is largely grown. The local practice has been to manure heavily, generally with goat manure, those areas which were used for tobacco cultivation.

The results of the analyses are given below: —

(Method II.)

	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted 3 mm. Sieve.		
No.	Water.	Organic. matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	—	—	·024	—	·32	·13	·010
2.	·91	4·18	·023	—	·73	·11	·067
3.	—	—	·003	—	·11	·04	·09
4.	—	—	·134	—	·80	·25	·01
5.	·67	6·42	·075	—	·34	·21	·63
6.	2·10	8·60	·170	—	·88	·78	·006
7.	—	—	·020	—	·20	·12	·03

Remembering that these represent soils under actual cultivation, and that in connection with a very exhausting crop, it may be observed that they all contain at least a fair amount of lime, and that this plant food is present in quite satisfactory proportion in most of the samples taken. The soil from Wupperthal was deficient in potash, but at Beukes Kraal the quantity of this constituent was normal, while of the Kromme Rivier samples No. 6 was very well stocked in this particular. Phosphoric oxide is either wholly inadequate, or present only in moderate proportion right through, sample No. 5 excepted: in the latter case the amount is, relatively speaking, so extraordinarily high as to suggest the inference that it is due to the method of fertilising already alluded to; in fact, seeing that in the soils of this Division the plant food constituents would not be expected to be present in any larger proportion than in the soils of the Ceres Division, where similar geological influences prevail, it is probable that nearly all these Clanwilliam soils had been altered in chemical composition by extensive fertilising agencies.

COLESBERG.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Upper Hantam.	Oorlogspoort.	W. Webb.
3.	,,	,,	,,
4.	,,	,,	,,
5.	,,	,,	,,
6.	,,	,,	,,

Six samples of virgin soil were collected at various localities on the farm Oorlogspoort, formerly known as Zeekoegat. The surface soil of the farm is ordinary Karroo veld, the underlying formation being shale, alternating with lime. The chemical composition of the soil is apparently influenced by the rocks of the Stormberg series.

The analyses of these soils resulted as shown in the following table:—

(Method I.)

	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted ½ mm. Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	91·1	2·49	3·73	·006	·064	·046	·156	·068
2.	92·7	2·67	3·69	·007	·064	·094	·165	·072
3.	93·8	2·94	3·84	·007	·071	·114	·183	·070
4.	97·6	4·40	6·51	·003	·165	·506	·203	·115
5.	98·1	2·33	3·84	·007	·101	·066	·184	·073
6.	94·7	3·51	3·81	·006	·064	·216	·136	·069

These soils, somewhat similar in their geological origin to those of the Albert and Aliwal North Divisions, are, like the soils of the Divisions named, all rather fine in texture, but better, in respect of potash, than the

Albert soils analysed. They all contain a satisfactory proportion of potash, and a fair amount of phosphoric oxide. No. 4 is well supplied with nitrogen and lime, and all the others had fair percentages of nitrogen. Lime is the only element of plant food that can be described as actually lacking in any of these soils; in this respect the soils represented by samples 1, 2, and 5 were defective.

Elliot-Slang River.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	—	Lutha.	S. L. Hart.
2.	—	,,	,,
3.	—	,,	,,
4.	—	Ettrick.	W. F. Beadon.

Three samples of soil taken at Lutha, in the Elliot District, midway between Elliot and Indwe, were analysed. In the valleys the surface soil is usually black, with a pot-clay subsoil commencing about twelve inches below the surface: this black surface soil is represented by No. 2. On the hill-sides the soil is either light and sandy, or deep red, according as the ledges above consist of sandstone or ironstone. Samples of both these types of soil were collected. No. 1 on the list was a fine sandy soil collected from a hill; practical experience had found it fairly good, *when fertilisers were applied,** but the deep red soil—of which No. 3 was a specimen—is said to be the best. The subsoil, in both cases, is a clay, commencing from one to ten feet below the surface. Most of the cultivated farm lands are on the hills; the soil there is cooler, more retentive of moisture, and stands drought better. The valleys provide heavier crops during good seasons, but the valley soils, being very shallow, need frequent rains if a fair crop is to be ensured. Where available, the alluvial deposits of old river beds are best of all. As for the valley soils, it has been found necessary to abandon them for cereal crops, and devote them to lucerne, as the continual ploughing and heavy rain storms denude them very rapidly and form large sluits, a condition which does not result in the higher and sandier localities.

It may be remarked that the geological formations in the neighbourhood of Ida ('Mbokotwa Commonage), near to which the farm whence these samples were taken is situated, belong principally to the Stormberg series; that is to say, they are chiefly composed of Molteno sandstones, and of red beds resembling the Burghersdorp beds. The former are naturally poor in plant food, and the first sample on the list is a type hereof; the Red Beds, on the other hand, have a better reputation, while the dykes of dolerite which intersect in the sandstones, would also tend to improve the soil by the addition of lime.

Another sample of soil was taken from dry agricultural lands on the farm Ettrick, and represented fairly the soil in the neighbourhood, on which, it is said, nothing will grow. Chemical analysis shows it to be practically as poor as the sample of sandy soil from Lutha, and thus fully confirms the agriculturists' views.

---

*Chemical analysis shows the natural condition of the soil to be poor all round.

The following are the analyses of the above mentioned soils:—

(Method I.)

No.	Percent of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	98·1	1·25	2·72	·0035	·073	·036	·043	·020
2.	97·7	8·20	19·67	·0187	·263	·482	·153	·110
3.*	90·8	3·31	10·60	·0057	·170	·154	·111	·088
4.	98·0	·99	4·38	·006	·074	·056	·049	·038

Fort Beaufort.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Fort Beaufort.	Fort Beaufort Asylum.	Medical Superintendent.
2.	,,	,,	,,
3.	,,	,,	,,
4.	,,	,,	,,

The only samples of soil from this Division that have been analysed are four from the grounds around the Fort Beaufort Asylum. Nos. 1 and 2 were taken from the garden at the male asylum, and Nos. 3 and 4 from the female asylum garden. The site is in a valley which receives the drainage of surrounding hills about a quarter of a mile distant: the subsoil is red, with fragments of limestone, and overlies a blue shale. All the subsoil water in the valley is reputed to possess a sulphurous odour.

The analyses of these soils resulted as below:—

(Method I.)

No.	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted ½ mm. Sieve.		
	Fine earth.	Water.	Organic. matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	87·4	2·20	4·05	·009	·102	·154	·188	·070
2.	87·8	3·24	5·45	·008	·147	·190	·189	·077
3	89·7	2·40	4·66	·005	·132	·444	·263	·191
4.	77·6	3·49	10·50	·007	·442	1·058	·197	·536

As these soils have evidently been affected by cultivation and fertilising, very little in the way of general conclusions regarding them can be drawn. Apparently in their original state they were not well supplied with phosphates, for in Nos. 1 and 2 the amount of phosphoric oxide is

*For mechanical analysis of this sample see under heading "Physical composition of soils" (Part VII.).

still low. The lime, organic matter, and nitrogen in No. 4 are unusually high, no doubt as a result of treatment with fertilisers; for the rest it is scarcely possible to tell whether the plant food constituents found are due to natural causes or to manipulation, so that the practical inutility of basing general conclusions upon analyses of cultivated soils is once again exemplified. Taking the soils, however, as they stand, none of them can be said to be really deficient in any form of plant food, and No. 4, as already indicated, is rich in nitrogen, lime, and phosphates, and is moreover satisfactorily stocked with potash. No. 3 is likewise rich in lime and well supplied with potash and phosphates, the proportion of nitrogen being normal. The remaining samples, with the exceptions noticed, are satisfactorily supplied with all the principal plant food constituents.

George.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Outeniqualand.	Uitkyk.	J. Muller.
2.	,,	Greak Brak River.	,,
3.	,,	,,	,,
4.	,,	Diep Kloof.	C. F. Juritz.
5.	,,	Palmiet.	,,
6.	,,	Modder River.	,,
7.	George.	Hans Moes Kraal.	,,
8.	The Lakes.	Outspan Reserve	,,
9.	,,	Woodville.	,,
10.	,,	Diep River.	,,
11.	Klip and Doorn Rivers.	Groot Doorn River	,,
12.	,,	,,	,,
13.	,,	Klip Drift.	,,
14.	,,	,,	,,
15.	,,	,,	,,
16.	Before Long Kloof.	Grootfontein.	,,
17.	,,	Schoonberg.	,,
18.	,,	Ganze Kraal.	,,
19.	,,	Kykoe.	,,

The hamlet of Great Brak River is distant about 2½ hours' cart journey from the town of George, in a south-westerly direction: a typical sample of the intervening area is No. 1 in the above list, a "sour" soil taken from Uitkyk, a farm in the George Division, but near to the Great Brak River, which forms the natural boundary between the division named and that of Mossel Bay. No. 2, a red and more sandy soil, typifies another portion of the area referred to; it was selected from new lands on Mr. H. Barnard's farm, quite close to the main road, on the heights above Great Brak River. From the lands of Mr. C. Searle, M.L.A., on the left bank of the river, No. 3, in appearance a very similar soil, was secured.

After leaving Great Brak River for George a short extent of granitic soil is passed over, speedily, however, succeeded by a red pot-clay. Later on this in turn gives place to a blacker and looser clay, of which a sample, No. 4, was collected on the farm Diep Kloof, about four miles by road from Great Brak River. This sample is typical of the soil of the surrounding farms; by practical farmers it is considered to be rather poor, and chemical analysis quite bears out this testimony: when manured it answers well, a fact which tends to show that its defects are wholly chemical. Another sample of the same class, although somewhat lighter and sandier, No. 5, was collected four miles further on, at Palmiet, part of the farm Moeras River. Between these two points there are a few patches of granite soil, but the predominating clay is soon reached again. Sample No. 6 was procured at Modder River, near the entrance to the village of Blanco. This soil, which is chemically poor except as regards nitrogen, appears to be derived from the band of slate which stretches eastwards, north of Blanco: it is typical of the stiffer clay soils which skirt the southern slopes of the Outeniqua Mountains, between the Great Brak River and George, the coast soil being of a sandy nature and sweet, whereas the intermediate belt, from which samples 3 and 4 were taken, is a mixture of the two classes of soil. Of the sandy belt a sample, No. 7, was taken from the granite formation near Pacaltsdorp, on the farm Hans Moes Kraal, at a distance of about five miles by road from George: this also is an all-round poor soil. A sample of sandy clay, No. 8, resembling the soil taken at Blanco, and lying on an extension of the band of slate already referred to, was collected from the Outspan Reserve about 12 miles by road east of George. Another similar sample, No. 9, was taken about three miles nearer Knysna, from Woodville, the farm of Mr. J. Stevens. Tobacco has been cultivated here to some extent, and good results are said to have been achieved as regards potatoes by the use of basic slag. At Diep River, three miles from Woodville, sample No. 10 was collected. This soil, together with Nos. 1 and 2 of the Knysna Division soils, are representative of what has been called the intermediate belt of soil. According to the analysis the soil of which No. 10 was a sample is apparently well supplied with nitrogen, but poor in other respects.

Returning to George, and crossing the Montagu Pass, where Table Mountain sandstone is entered upon, a sandy tract of country is passed over on the farms Doorn Rivier and Soldaats Kraal overgrown with rhenoster bush, alternating further on with proteas. Here we touch the western end of the long valley known as the Long Kloof, which stretches between the sandstone mountains for a distance of over one hundred miles, through this division and the adjacent division of Uniondale into the Humansdorp Division beyond. The soils in this valley are mostly derived from Table Mountain sandstone, and are only saved from extreme poverty by the presence of the Bokkeveld beds which here and there increase the amount of lime otherwise in the soil. On the farm Klip Drift two samples of soil were collected; No. 15 an alluvial (vlei) soil, and No. 14, a soil from the hill behind the homestead and about 400 yards from No. 15. This is succeeded by a Karroo soil, extending westwards to the farm Groot Doorn Rivier, where another sample, No. 11, was collected, the ground being here of a more stony nature: this accounts for the small proportion of "fine earth" found. The farm, it may be mentioned, takes its name from the mimosas which abound in the neighbourhood. Of the Karroo soil, a sample, No. 12, was taken on the return journey to Klip Drift, about two miles back, and another, No. 13, half-a-mile from the homestead on the last-named farm.

On the road to Uniondale a series of samples representative of the Long Kloof soils was taken, covering a stretch of about seventy miles. The first of these was on the farm Grootfontein, 13¾ miles from Klip Drift, No. 16, a loose though somewhat stony soil, where rhenoster bushes prevail. The latter remark applies equally to the farm Schoonberg, seven miles further E.N.E., where No. 17 was collected. Covering another five miles, Ganze Kraal was reached; here there is less rhenoster bush and more mesembryaceæ; at this place sample No. 18 was taken. About 13¾ miles lower down the Long Kloof, sample No. 19 was collected on the farm Kykoe. These four samples, Nos. 16, 17, 18, and 19 represent the soils of the Upper Long Kloof in the George Division. Together with the samples 4, 5, 6, 7 and 8, of the Uniondale Division soils, taken subsequently in the Middle and Lower Long Kloof, they make up our series of samples representative of the Long Kloof.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
20.	Outeniqualand.	Uitkyk.	T. Searle.
21.	,,	Great Brak River.	,,
22.	,,	,,	,,
23.	George.	Govt. Forest Plantation.	C. R. Ross.
24.	,,	,,	Distr. Forest Officer.
25.	,,	,,	,,
26.	,,	,,	,,
27.	,,	The Island.	P. Bornemisza.
28.	Kamnassie.	Vogelstruisfontein.	,,
29.	The Lakes.	Lancewood.	,,

Nos. 20, 21, and 22 were collected from as nearly as possible the identical spots where Nos. 1, 2, and 3 respectively had been taken on a former occasion. The analyses of the latter samples had been conducted according to Method III., and as it seemed probable that the results so obtained were too high, it was deemed desirable to procure fresh samples and to analyse them by Method I. for comparison, in order to ascertain, as far as that could be done, what differences of results could be detected between the two methods: it may be said that about three years had elapsed between the taking of the first and of the second set of samples.

Of the samples taken from the Forest Plantation at George, No. 23 bore close resemblance to the other alluvial soils from that Division as regards texture and general physical condition, its content of moisture and organic matter, and its almost all-round poverty in plant food. Nos. 24, 25, and 26 were taken from different parts of a site on which it was proposed to establish a forest nursery.

Soils intended to be employed for the cultivation of tobacco were also procured for analysis. One of these was obtained from Vogelstruisfontein, another from the farm Lancewood or Hooge Kraal and a third from the Ven. Archdeacon Fogg's farm The Island, situated to the north of George town and adjoining the town commonage.

In the November issue of this *Journal* a map of the George Division will be published showing the areas whence the above described soils were collected.

The results arrived at by chemical analysis are given in the tables below: —

(Method I.)

	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted ½ mm. Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
4.	94·7	·97	3·51	·0138	·140	·028	·034	·020
5.	90·5	·56	2·52	·0123	·098	·020	·031	·013
6.	98·1	·87	4·03	·0212	·161	·042	·015	·031
7.	97·8	·47	2·24	·0216	·091	·028	·017	·019
8.	97·8	1·62	6·57	·0283	·203	·034	·016	·022
9.	98·2	1·41	6·02	·0127	·189	·024	·010	·015
10.	97·0	1·12	5·94	·0481	·168	·026	·016	·031
11.	35·0	·86	7·41	·0835	·168	·028	·102	·083
12.	75·8	·86	5·44	·0913	·168	·052	·122	·090
13.	90·9	1·35	6·09	·5008	·168	·096	·095	·067
14.	73·5	·80	5·59	·0679	·189	·040	·136	·079
15.	79·6	·60	2·17	·0626	·112	·068	·066	·028
16.	66·8	2·78	8·06	·0580	·245	·040	·041	·095
17.	81·9	2·84	7·37	·0569	·168	·030	·066	·068
18.	42·6	1·22	4·35	·0948	·154	·062	·043	·038
19.	76·7	·44	2·87	·0212	·098	·012	·068	·058
20.	94·3	—	—	—	—	·050	·023	·012
21.	93·6	—	—	—		·094	·061	·015
22.	91·0	—	—	—	—	·044	·017	·008
23.	96·6	2·27	8·96	—	·02	·072	·027	·097

(Method II.)

	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through 3 mm. Sieve.		
No.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
24.	1·43	6·73	—	—	·28	·21	trace.
25.	1·27	5·04	—	—	·318	·019	·038
26.	1·06	6·51	—	—	·24	·24	·014
27.	·56	14·89	·019	—	·11	·44	·10
28.	·74	8·61	·008	—	·92	·23	·028
29.	1·05	5·51	·034	—	·96	·77	·12

(Method III.)

	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm Sieve.		
No.	Fine earth.	Water.	Organic matter	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	92·4	1·67	3·89	·011	·026	·25	·14	·11
2.	89·2	2·37	5·48	·0097	·044	·19	·25	·029
3.	85·0	·68	1·74	·058	·030	·25	·27	·055

It will be noticed that Nos. 1, 2, and 3 show much larger proportions of lime and potash than Nos. 20, 21, and 22. Making full allowance for the fact that the one set of samples was collected a long time after the other,

and taking due account of their having been collected by different persons, and possibly not from the identical spots in each case, and of their having been analysed by different analysts, it still remains clear that the one method yields much higher results than the other, as indeed one would expect from the inherent differences between the respective solvents used. From the nature of the soils examined one could not otherwise than conclude that by Method III. a large amount of plant food constituents was extracted from the soil which it would not be proper to consider as plant food in the sense to which the term has been restricted in the course of the present discussion. That such a conclusion would be just seemed clear from a comparison of the above results, and further proof of this will be forthcoming when the Divisions of Mossel Bay and Riversdale have to be dealt with.

The southern part of the George Division, that is to say, the portion lying between the Outeniqua Range and the sea, cannot, from a chemical point of view, be considered as very promising: the samples examined, which come from that area, are, almost without exception, poor in all the important elements of mineral plant food. The soils are very fine grained, and there is a good quantity of nitrogenous material in the soil, but with the lack of lime, and the acid nature of the soil, it is exceedingly doubtful whether much of it is capable of conversion into a form in which it could be absorbed by plants.

On a later page, in connection with the soils of the Malmesbury Division, allusion is made to the clay slate beds which constitute the oldest sedimentary rocks of the south-western part of the Colony; above these lies the sandstone formation with which not only the Outeniqua Mountains are capped, but also all the mountain ranges stretching from Table Mountain in the Cape Division to Cape St. Francis, including the Hex River Mountains and the Langeberg Range. This sandstone, by disintegration, forms a loose sand, very poor for agricultural purposes, producing a vegetation of little more than sour grass. Firs, and similar forest trees may, nevertheless, find sufficient nourishment in such soils, though unsuited for ordinary crops.

North of the Outeniqua Mountains the potash in the soil shows some improvement: the five soils collected on the farms Klip Drift and Groot Doorn Rivier all contain a fair amount. This is also the case in regard to phosphoric oxide, except as far the alluvial soil No. 15 is concerned. This soil is poor in phosphates, and is also poorer than any others in the neighbourhood in respect of potash. In all these soils lime is still very deficient, although not to the same extreme as south of the Outeniquas.

The Long Kloof soils, extending from Grootfontein in the George Division to Krakeel River in the Division of Uniondale, and represented by samples 16, 17, 18, and 19, in the above list, together with Nos. 4, 5, 6, 7, and 8 of the Uniondale Division soils, are uniformly poor in lime, and just escape a poor potash average. The soils from the western part of the Long Kloof showed a fair amount of phosphates, Ganze Kraal excepted, but further east there appeared a decided deficiency.

To summarise in broad terms, the soils of the George Division are, taken as a whole, poor in lime and phosphates, but contain a fair proportion of potash, and are rich in nitrogen.

Gordonia.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	No. 1.	Upington.	Dr. E. A. Nobbs.
2.	"	"	"

The above were two very finely-grained soils collected from lands under irrigation at Upington. The samples were very typical of the alluvial lands along the banks of the Orange River at that point. The soil had been under cultivation for twenty years, and had been periodically enriched by deposits of silt from flooding. Soils of a similar nature will be referred to in connection with the Prieska Division.

The analyses of the above soils resulted as follows:—

(Method I.)

	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted ½ mm. Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	100	3·23	3·49	·0209	·052	·582	·093	·061
2.	100	1·68	2·05	·0184	·022	·400	·065	·052

It will be noticed that the nitrogen content of these soils is low, but they are rich in lime, and fairly well provided with potash and phosphatic material.

GRAAFF-REINET.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Graaff-Reinet.	Graaff-Reinet Town.	C. Mayer.
2.	,,	,,	,,
3.	,,	,,	,,

These three samples were taken from different depths at a locality in the township of Graaff-Reinet where vines were dying off from some unknown cause. Local vignerons had been greatly perplexed in consequence. Diligent inspection had revealed neither insects nor fungoid growth, and in all cases decaying roots and a dead root stem indicated that dying had commenced from below, and had worked its way upwards to the surface of the soil. It was thought that brackishness of the irrigation water had contributed to the affection, but analysis of the water did not confirm this view: it appeared, however, that excessive irrigation was the chief cause, and imperviousness of the soil to air owing to its compact nature and deficient drainage. In any case, the affected vines were invariably associated with the free practice of irrigation: the soils were usually irrigated once every month.

The chemical analyses* resulted as follows:—

(Method I.)

	Percent of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	94·8	2·56	3·80	·0120	·154	1·148	·300	·079
2.	95·5	2·[illegible]2	4·10	·0150	·231	1·288	·318	·072
3.	95·4	2·93	3·32	·0067	·175	1·364	·318	·073

*For mechanical analysis see under "Physical composition of soils" (Part VII.).

The first of these samples was taken at the surface, No. 2 at a depth of 10 inches, and No. 3 at from 18 to 24 inches from the surface. The soil is of far finer texture than those generally associated with the cultivation of the vine in the Western Province: the three samples are all rich in lime, well supplied with nitrogen and potash, and have a fair reserve of phosphoric oxide: apparently, therefore, it was not deficient storage of plant food that was the cause of vine-failure. The amount of chlorine in the soil was no higher than has been found to be the case in several soils of the Paarl and Worcester Divisions. Hence it seemed to be a just inference that the causes were physical rather than chemical. This was evidently an instance where the weak link of the chain was not lack of plant food.*

HANOVER.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Hanover.	Hanover.	Forest Officer.
2.	"	"	"
3.	"	"	"
4.	"	"	"
5.	"	"	"
6.	"	"	"

These soils were taken from the Government Forest Plantation at Hanover. The plantation forms part of Hanover Commonage, and is about ten miles distant from Hanover Road Railway Station. Nos. 1, 2, and 3 represent surface soils, and Nos. 5 and 6 clay subsoils. No. 4 was a specimen of the limestone which underlies the soil at this locality.

The results of the analyses of the above samples are stated in the following table:—

(Method II.)

	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve		
No.	Water.	Organic matter.†	Chlorine.	Nitrogen.	Lime	Potasch.	Phosphoric oxide.
1.	4·25	23·29	—	—	22·75	·26	·010
2	3·94	25·31	—	—	15·41	·13	·089
3.	1·94	3·21	·0049	—	1·62	·21	·0036
4.	5·09	29·27	—	—	32·46	·12	·124
5.	5·83	27·03	·0191	—	26·60	·15	·096
6.	7·35	24·22	·0104	—	19·00	·21	·052

All of these samples contained an abundance of lime, largely in the form of calcium carbonate: they are all well supplied with potash, but the proportion of phosphoric oxide varies considerably, ranging from the extreme of poverty, in one case, to a fairly satisfactory amount in others.

**Vide* remarks in this connection on pp. 175 and 176 of this Vol.

†This also includes carbon dioxide combined as calcium carbonate.

Herbert.

(Privately Collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Lower Albania.	Backhouse.	A. C. Martin.
2.	,,	Erf No. 5.	,,
3.	,,	Erf No. 36.	,,

The three samples enumerated in the above list were taken from the area proposed to be brought under irrigation in connection with the Douglas irrigation works. The first sample was taken from the farm Backhouse, near the main canal, at chainage 4 miles 30 chains. No. 2 was collected on Douglas Commonage from the middle of Agricultural Erf No. 5, and is fairly representative of all the erven lying along the river bank. No. 3 was taken from Agricultural Erf No. 36, also on the commonage, near the main canal, at chainage 6 miles 10 chains, and may be considered as a type of the erven along the route of the canal.

In every case the samples represent virgin soils, and were carefully collected so as to typify the surface soil to a depth of twelve inches. They were each analysed according to Method I. and also by Method V., and the results of these analyses are tabulated below.*

(Method I.)

	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	96·1	1·79	3·24	·0566	·049	·174	·061	·058
2.	99·0	1·80	3·76	·0707	·042	·552	·103	·105
3.	87·9	3·00	6·01	·0283	·098	2·128	·053	·070

(Method V.)

	Percentage of Soil sifted through 3 mm. Sieve.	
No.	Potash.	Phosphoric oxide.
1.	·010	·016
2.	·018	·037
3.	·009	·008

It will be seen that in each case about six times as much potash was extracted from these soils by Method I. as by Method V., and in two cases the quantity of phosphoric oxide extracted by Method I. was about 3 to 3½ times that obtained by Method V. In the third soil the directly available phosphoric oxide was only one-ninth the available reserve.

On the basis of the minimum limits suggested by Dr. Dyer, viz., ·005 per cent. of potash and ·010 per cent. of phosphoric oxide, the first two soils, at all events, are sufficiently well supplied with these elements of plant food in a state ready for immediate use.

*For the results of determinations of alkaline salts in the above soils see under the head of "Alkalinity of soils" (Part VI.).

Hope Town.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	North Middenveld.	Vluitjes Kraal.	Dr. E. A. Nobbs.
2.	,,	,,	,,

Two fine-grained soils were collected from the farm Vluitjes Kraal: No. 1 had the characters of a good Karroo soil, and was typical of a considerable area. No. 2 was taken from what is known as vlei land.

The analyses of these two samples resulted as below:—

(Method I.)

	Percent. of Field Sample.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	96·2	3·96	3·02	·0035	·050	·478	·085	·019
2.	95·7	7·20	4·24	·0014	·057	·332	·275	·033

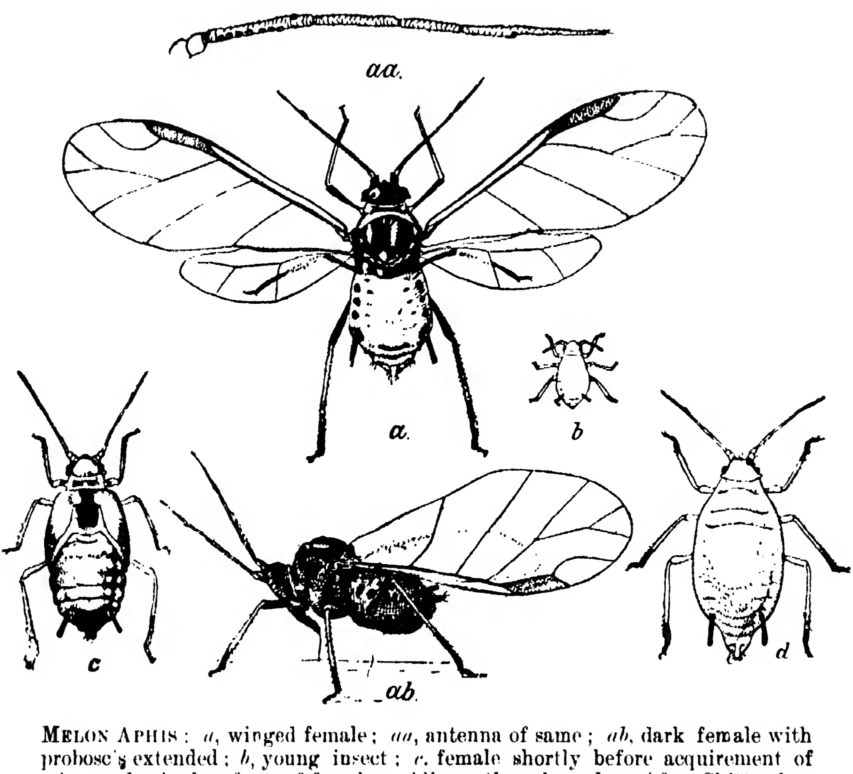
The proportion of phosphoric oxide in these soils is low, nor are they particularly well supplied with nitrogen; on the other hand, they are both rich in lime, in this respect resembling many of the soils of the neighbouring Divisions of Albert, Aliwal North, and Colesberg.

MELON APHIS.

AN INSECT INJURIOUS TO MELONS, MARROWS, CALABASHES, CUCUMBERS, ETC.

By CHAS. P. LOUNSBURY, Government Entomologist.

The Melon Aphis (*Aphis gossypii* Glover) has probably been in this country for many years, and may, indeed, be indigenous here for anything known to the contrary, but many farmers who grow melons and allied crops were ignorant of its presence before last year, when, by reason of its



MELON APHIS: *a*, winged female; *aa*, antenna of same; *ab*, dark female with proboscis extended; *b*, young insect; *c*, female shortly before acquirement of wings; *d*, wingless form of female. All greatly enlarged. (After Chittenden, U.S.A., Department Agriculture).

destructiveness, it attracted attention in many districts. Whole fields of watermelons and cucumbers were killed by it in the Cape Peninsula, and very serious injuries to these and other cucurbitous plants, including the calabash, were reported from other South-western parts. A letter to the *Agricultural Journal* (June issue, page 774) made it known that the insect was also destructive to watermelon plants in the Uitenhage district, not only in 1908, but in 1907 as well. The insect has not been the subject

of special investigation by this office; but in view of the possibility that it may be again abundant in the coming season, this account of it has been compiled. The writer's attention was first drawn to the insect in 1896, in which year it was quite abundant on melons in Constantia and on the Cape Flats. Specimens then collected were determined at Washington as identical with the common American melon attacking aphis, and specimens from Constantia and Paarl sent this year were also considered identical by the same authority. The insect is widespread in the United States, where it seems to be more destructive than in South Africa, and it is also reported from the West Indies, Mexico, Brazil, and South Australia. In the United States it is said to be the worst aphis pest in the country, although some other kinds may attract more attention in some seasons.

Description.

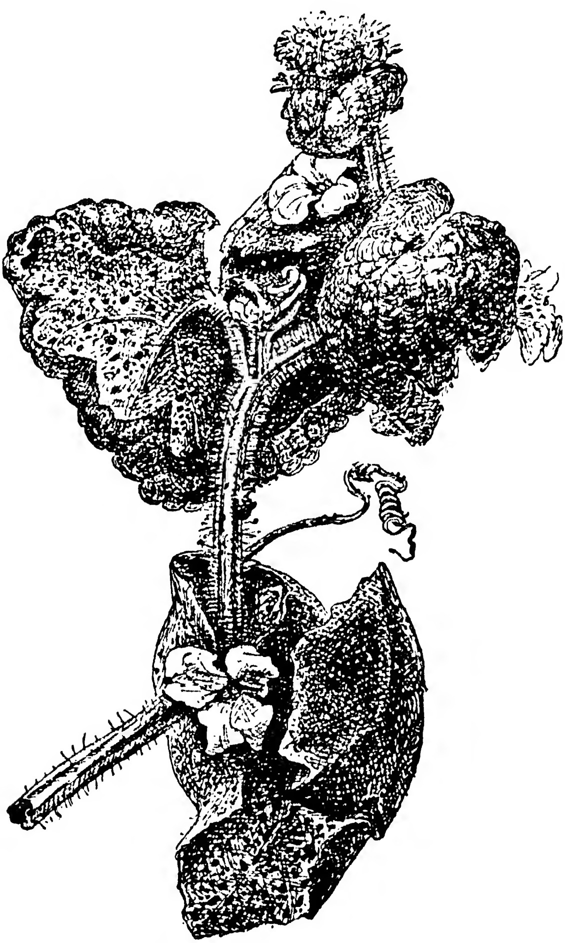
To the unaided eye there is little to distinguish the melon aphis from many other aphides. It is a small species, more or less like those found in Kafir corn and mealies, or the larger ones found on sweet peas, barley, and wheat, and like these it gives off a copious quantity of "honey dew." Usually the insect is dark green, but it may be a dirty yellow or greenish black, the colour of individuals being extremely variable even on the same leaf. Wingless specimens greatly predominate until the leaf attacked is much weakened, when winged forms may become more numerous, but both winged and wingless ones are generally present together. The common method of multiplication is the production of living young by non-fertilised (agamic) females, and, indeed, males seem not to have been observed. Generation succeeds generation rapidly under favourable conditions. In Colorado new-born aphides have been reared to the reproductive stage in eight days, and six to eight births from one mother in a day has been found to be a common occurrence. ("Journ. Econ. Ent.," June, 1908.) Winter eggs have been discovered in America, but in the vicinity of Cape Town females remain active throughout the year, and development is merely retarded, not entirely checked, so that an egg stage is unnecessary.

The food, of course, is the sap of the plant taken through the suctorial mouth organ. The underside of the leaves may become thickly coated with the bodies, and the effect of the attack on the growth of the plant is what generally attracts attention to the insect. The leaves almost cease to expand, curl, and become crumpled, and lose colour. Young plants quite commonly perish, and plants which have made good growth before becoming attacked may yet become so weakened that they develop little fruit.

Food Plants.

The insect is best known on cucurb plants, but it takes its specific name *gossypii* because of its attack on cotton. Of the cucurbs, the watermelon, cucumber, and calabash seem to suffer the most, but the sweet melon (spaanspek), when planted at the same time, may suffer as severely. Few kinds of aphis are able to maintain themselves on such a wide range of plants as this one. Dr. Chittenden, of the U.S. Department of Agriculture, says: "It is partial to . . . melons and other cucurbits, cotton, okra, orange and other citrous fruits, strawberry, and purslane, but it attacks also clover, beans, beets, spinach, tomato, hops, and pear, and several ornamental plants, including hydrangea, begonia, ground ivy (*Nepeta glechoma*), acalypha, and morning glory. . . . Mr. Pergande [Aphis expert of the same Department.—C.P.L.] has found it feeding

upon a large number of weeds, amongst which are shepherd's purse, pepper-grass, pigweed (*Amaranthus*), dock (*Rumex*), burdock (*Arctium*), dandelion, lambsquarters (*Chenopodium*), plantain, chickweed, button-weed (*Diodia*), mallow, dogwood (*Cornus*), and jimson weed (*Datura*)." It has not been studied in South Africa sufficiently to say how many of the plants named are affected here, but probably many of them are. The last named plant is our common stinkblaar. During the early part of this winter nightshade (*Solanum*) was noticed to be much infested near where



MELON APHIS: Spaanspek leaves stunted and curled by aphides on lower surface. Natural size. (After Chittenden, U.S.A., Department Agriculture).

pumpkin plants, still infested, were dying off. The common orange aphis of South Africa is not the Melon Aphis, and it is only rarely that the latter species has been found on any citrous tree in this country, and then only in small numbers.

Natural Control.

The Melon Aphis, like all other insects of its kind, is immensely prolific. It is preyed upon by many parasitic and predaceous enemies, and before any season is fully over these enemies amongst them are almost

sure to reduce it to small numbers, however abundant its food plants may remain. Dr. Chittenden reports that about thirty-five different species of insects are known to prey upon it. These enemies include many kinds of ladybirds, both in their larval and beetle stages, the maggots of certain syrphus flies, aphis lions, and internal wasp parasites. Fungous diseases also affect it severely. The chief South African ladybird that feeds on it is the Chilomenes (*Chilomenes lunata*), a yellow or red species with black markings, and the largest of all our common ladybirds. Syrphus fly enemies are also common here, and four to six species of internal parasites were reared from Constantia specimens. Dr. Chittenden is very anxious to introduce the last to the United States, in the hope that they would prove valuable supplements to the parasites already there.

The reason why this and some other aphides are vastly more abundant some years than others in America is now known to be atmospheric conditions which are favourable to them, whilst much less so to the internal parasites, and it seems probable that the explanation holds in this country. It is now recognised in America that the parasites work best in dry, warm weather, and that important ones practically cease to develop at a temperature which is quite warm enough to keep the aphides growing and breeding. When a cool, moist spring follows a warm winter, the experts now know to expect trouble with aphides, for under such conditions the pests get a long start of the parasites. Ladybirds in general will work at as low a temperature as the aphides, but they breed too slowly to keep pace with the latter. The enemies of the Melon Aphis are fully adequate to keep it suppressed in many seasons, and no better work could be expected of any parasite which might be introduced from another country unless it possesses the ability to continue to feed and breed when our native species incline to dormancy.

The meteorological reports, published from month to month in the *Agricultural Journal*, show that the temperature of the Colony during the months of May, June, July, August, and September, 1907, were all warmer than the average, while the months of October, November and December, that is the whole spring, were cooler than the average. From what has been stated, it is clear that these conditions favoured aphides, but retarded the development of their parasitic foes. In the south-western districts in particular farmers will remember the comparative dryness and warmth of the winter months and the comparative wetness and coolness of those of the spring. The month of May was particularly warm, the day temperatures averaging 6·4° above those of the previous year. October is recorded as one of the coldest for many years, the temperatures averaging 3·3° below the normal. The average for November was 1·2° below, and for December 1·7° below. In November the days were especially cool, the temperature averaging no less than 3° below the normal.

Preventives and Remedies.

In America considerable stress is laid upon clean cultivation of the land to be planted with cucurbs as a means of escaping severe infestation by the Melon Aphis. Dr. Chittenden in the latest United States Government report (Circular No. 80, Entomology series) on the subject says:—

"Cultural methods give greatest promise as remedies. Clean gardening or farming with fall plowing should always be followed, as these form a most valuable measure of prevention of injury by this and other insects that are present in the fields. As soon as the crops are off, the remnants should be gathered and burned. All weeds in the vicinity should be kept down throughout the year, including late fall and early spring, since, as has already been shown, the common weeds of the field and garden are available as alternate food plants and serve as the hibernating quarters of the insects, which feed more or less throughout the warmer periods of winter."

How far these remarks apply to their conditions must for the present be left to the South African farmers to decide for themselves. In districts where a heavy winter growth of weeds is desirable, much might yet be done to repress the insect by cleaning up the land after the crop is off and by preparing it in the spring sufficiently in advance of planting to starve out or otherwise kill the pest.

The aphis succumbs readily to the common contact insecticides; but the fact that it is difficult to spray the underside of the prostrate foliage, particularly after this becomes distorted from the attack, and also because of the rapidity with which it increases in numbers, renders the pest a difficult one to combat. Satisfactory results depend very largely in preventing it from becoming abundant,—that is, by finding and destroying the first colonies. To this end it is essential that the young plants be carefully watched. In Indiana, U.S.A., a State in which thousands of acres are planted to melons, the best remedy is said to be "to watch the field carefully from day to day and to destroy affected plants as quickly as discovered" (Purdue Bulletin 123). A similar course is practised in the immense sweet melon fields of Colorado where the farmers heap the soil over any plant which they find attacked (U.S. Ent. Bulletin, 52); and Cape farmers will probably find this remedy the cheapest and best for them if too many plants do not get attacked.

Experiment station experts in several of the United States have demonstrated that fumigation of melon plants is practicable for the destruction of the aphis, and they recommend this method in preference to spraying when large fields have to be treated. Carbon bisulphide vapour and hydrocyanic acid gas have both been used successfully; but tobacco smoke, generated from paper impregnated with tobacco products, has proved superior for the particular purpose and is said to be used extensively by growers in some sections of the country. The tobacco paper is bought ready prepared in sheets, and a piece of the proper size has only to be lighted and burned without flame under a cover thrown over the plants to effect the speedy destruction of the aphides. The covers should not touch the plants. They are usually oiled sheets of cheap calico supported on light wooden frames. For plants two or three feet long a frame about 4 feet wide by 6 feet long and eight inches high, made of strips of wood about two inches wide by three-quarters of an inch thick is used. The cloth is cut large enough to have about four inches rest on the ground all around. After being made to size and oiled, it is put over its frame and fastened in place by diagonal strips of wood which at the same time serve to brace the frame. A plant is kept covered ten to fifteen minutes, and after a little experience one man is said to be able to keep about ten covers in use. Should any Cape party desire to adopt this remedy, the writer would be pleased to help him get fumigation paper. Wind is a serious drawback when fumigating, but it is not necessary to have the plants dry when using tobacco as it is when using cyanide gas. Unoiled covers of stout drill or calico, such as is used for cyanide fumigation, could be substituted for the oiled covers described.

Spraying is still much more used in America for combating with the Melon Aphis than is fumigating, and doubtless would also be considered by South African farmers as more suitable for their conditions. Any of the common contact washes, such as resin wash, paraffin emulsion, soap suds, or tobacco sheep dip, are suitable for the purpose, but *earliness* and *thoroughness* of application are essential to satisfaction. Probably most farmers would find a reliable tobacco extract sheep dip used at not less than one part to one hundred fifty parts of water, or for the dilution to

contain not less than one-twentieth* of one per cent. of nicotine, a more convenient wash to use than any of the others mentioned. A device for under spraying, that is for directing the nozzle upwards so as to wet the under surface of the leaves, is indispensable. In small gardens where a relatively expensive remedy can be afforded, pyrethrum insect powder or Keating's powder may be used advantageously. Several liberal dustings may be necessary, and of course, they should be to the under surface where the insects are located. Applications of arsenate of lead or other arsenical will not destroy the aphides and are likely to do harm.

FRUIT EXPORT.

Return of Fruit Shipped from Cape Colony during August, 1908.

Port of Shipment.	Destination.	No. of Packages.	Description of Fruit.	Quantities.	Value. £ s. d.
Cape Town ...	England	1,417	Oranges ...	210,212	530 16 0
,, ...	,, ...	12	Lemons ...	3,310	8 19 0
,, ...	,, ...	90	Naartjes ...	12,800	31 15 0
Port Elizabeth	,, ...	3,589	Oranges ...	170,519	667 0 0
,, ...	,, ...	121	Naartjes ...	5,370	41 14 0
,, ...	,, ...	88	Pines ...	2,143	14 0 0
Cape Town ...	St. Helena ...	3	Oranges ...	500	1 0 0
,, ...	,, ...	1	Naartjes ...	300	0 12 0
,, ...	German South West Africa	124	Oranges ...	17,330	37 8 9
,, ...	,, ...	33	Naartjes ...	7,275	15 7 6
,, ...	,, ...	82	Apples ...	11,260	58 7 6
,, ...	,, ...	18	Pines ...	1,226	14 2 0
...	,, ...	18	Bananas ...	10,600	17 12 0
...	,, ...	3	Limes ...	450	1 0 0
,, ...	,, ...	8	Lemons ...	1,200	3 11 6
,, ...	,, ...	9	Pears ...	1,125	5 7 6
,, ...	,, ...	1	Guavas ...	200	1 0 0

*One-half was stated in error in the article on Woolly Aphis on page 189 of the August issue.

FRUIT TREE STOCKS.

By C. T. Cole, Inspector, Vegetation Diseases Acts, Victoria, in the "Journal of Agriculture," Victoria.

What the foundation is to a house, the stock is to a fruit tree, and if trees are worked on unsuitable stocks disappointment will result, the tree will cease to be healthy and vigorous, and ultimately die or become useless.

Apple.—In Australia, we have made quite a new departure with regard to apple stocks. In the Old Country the seedling apple, or more commonly termed the crab stock, is the one used by nurserymen and orchardists, except in the case of dwarf apple trees, when the "Paradise" stock is used. Here, however, it was found, after some years of experience, that the crab stock was so subject to the woolly aphis (*Schizoneura Lanigera*) that it was almost impossible to cultivate apples at all; in fact apple culture was nearly at a standstill when the two now so well known blight-proof varieties, "Winter Majetin" and "Northern Spy" were introduced as stocks. After a certain amount of prejudice was overcome, growers on all hands recognised this discovery as a boon, and cultivators adopted it freely. The "Northern Spy' has proved better adapted as a stock than the "Winter Majetin" and is now almost exclusively used.

There are several other blight-proof kinds of apples which could doubtless be used as stocks, but there is no need to increase the number except for special purposes. Among thoughtful cultivators the question suggests itself—Is it desirable to keep to one stock only, and propagate by layers, roots, or grafting of roots? I think it is, and to prevent the stock from becoming weaker in its constitution, from constantly working and reworking upon the same variety, I have worked "Majetin" on "Spy," and "Maggs Seedling" (another blight-proof kind, and robust in constitution) upon the "Spy," with the best results.

For dwarf-apple culture the "Spy" can be used, and the "French Paradise" worked upon the "Spy," and the desired kind again worked upon the "French Paradise." This, however, becomes tedious. We have now in this State, raised from seed here, a "Paradise" apple tree of dwarfing habit—free surface rooting properties very easily propagated, and upon which the desired kinds may be worked direct. All kinds appear to thrive admirably upon it, and it is quite blight-proof.

It may be mentioned that even now there are localities where the old crab stock or seedling apple can be used with safety, viz., well drained, deep sandy soils; but such stocks are now so scarce that it would be difficult to obtain any from nurserymen. The blight-proof stock is now almost exclusively used.

Planters must take great care that their trees are worked sufficiently above the surface of the ground to prevent the scion from striking roots into the ground, and displacing the blight-proof stock, thus rendering the whole tree roots a blighted mass.

Apricot.—This is, perhaps, the most difficult to deal with in regard to stocks. Great dissatisfaction has been experienced by growers in consequence of their trees breaking off at the point of union with the stock while in perfect health; and in other cases by the trees having a stunted growth and sickly appearance. This is generally due to unsuitable stocks.

The plum stock now generally used is a variety of the "Myrobolan" called "La France," which is easily propagated from cuttings and does not sucker, but such varieties as the "Montgamet" and "Large Early" type, when worked upon the above stocks are very apt to blow off at the union of the tree with the stock when fully grown. I much prefer the common "Mussel" plum as a stock, as it succeeds well in most soils and climates, and the most popular market sorts do well upon it. The advantage of the plum stock over the seedling apricot is that it will adapt itself to almost any soil, whereas the seedling apricot is only suitable where the soil is light and warm, or well drained, the climate warm, and the rainfall not excessive. The seedling apricot is much sought after by planters in the warmer and drier districts of the State, and in many cases it does well. It stands much drought, and will grow when many other trees are at a standstill. It is, however, apt to grow too vigorously at the expense of the size and quantity of fruit, whereas the plum stock, which has a more dwarfing tendency, grows finer fruit as a rule. As in most fruits, the theory that if fine fruit is wanted the stock must not be too vigorous holds good with this as with most fruits. It is much better for a scion to somewhat overgrow the stock than for the stock to grow faster than the scion, or upper part of the tree. In the one case, well-developed fruit and heavy crops are the result, while, in the other, thin crops and poor fruit are the rule. The nourishment which should go to the fruit expends itself in wood and leaf—the cherry is a striking example of this. Some growers work the apricot upon the almond, a most unsuitable stock. Never plant trees upon this stock. The peach is a most desirable stock in localities where the plum does not do so well as the peach.

Peach.—The peach stock raised from the stone is, doubtless, under almost all circumstances, the best stock for the peach. Some difficulty is often experienced in getting the stones to germinate; some seasons they come up freely and in others very few grow. The stones from one season's crop of fruit will grow freely, while those from another season's crop will nearly all fail. Stones saved from medium sized mid-season's varieties are generally the best for planting. The stones, immediately they are collected, should be placed in the ground in a well sheltered position, and covered over with sand and allowed to remain there until planting time. When once the stock is above ground it is easily managed; it roots very freely, throws plenty of fibres, and a tap root which is easily managed, and does not require to be removed from the seed bed till the young tree is ready for transplanting to its permanent position. If the stones are planted in too rich soil, then a strong tap root is formed at the expense of fibrous roots; in such cases the tree should be removed when young. If possible, always bud the stocks the same season as they come up.

There are localities where the almond stock is preferred to the peach—not only preferred, but becomes necessary, as the peach refuses to grow and succeed on its own roots. In such districts as Swan Hill and south of Melbourne growers will, on no account, plant peaches upon any other stock than the almond. The effect produced upon the growth of the peach tree in these districts when upon the peach is remarkable. The tree assumes a thick bushy habit of growth, throwing out innumerable useless lateral shoots with no bearing wood. The tree remains a thick bushy

shrub, while those on the almond produce quite a different growth—fruitful shoots are made, covered with well-developed fruit buds. The leaves are of a paler green than upon the peach, and none of that useless unfruitful spray is made, and the result is good crops of fine well-coloured fruit.

Plum.—Several kinds of stocks are used for plum trees, viz., the "Julien" seedling plum stock, cherry plum "La France" (a variety of "Myrabolan ") and the "Mussel" plum stock. During a long experience I have found no better stock than the last named, if judiciously selected. The "La France' stock is now used by nurserymen. It will not stand excessive moisture, or thrive in badly drained grounds, and often in orchards when the trees are fully developed and in bearing, trees will suddenly die completely out in one season, especially such as the "Yellow Magnum Bonum" and that type of plum.

Sometimes seedlings are recommended, chiefly, it is maintained, because such do not sucker. This is quite a mistake. I tried the experiment several years ago, and found that those trees worked upon seedlings threw up many more suckers than those worked upon the ordinary sucker stock. It has been found that in many localities the "Cherry" plum has proved a good stock, causing robust growth and being in all respects desirable. All kinds, however, will not succeed upon it. The "Diamond" plum, and others of similar type, the "Orlean" and some others, succeed well upon it. Experience must decide as to which kinds are best adapted for the "La France" and "Cherry" plum in the particular districts in which they are grown. The two varieties mentioned are the only stocks which do not throw suckers, and for this reason are desirable to use when suitable soil and locality to be grown in.

Cherry.—Experience has shown that the stock in general use for the cherry in the Old Country is not adapted for these States. There, the seedling "Mazard" or wild black cherry, is used as a stock for orchard planting and the "Cerasus Mahaleb" or perfumed cherry, where dwarfing is required. Neither of these stocks is of any use here. Some few years ago there was a great demand for the seedling cherry stock, which, as a stock, is almost identical with the "Mazard," especially when raised from black cherries. At the period referred to, it was claimed for this stock that it had a hardy constitution, would attain a large size, and not throw up suckers like the stock generally in use. But, as predicted at the time, its popularity was but short-lived. It was found that the varieties worked upon this seedling stock grew splendidly for a few years, and had the appearance of making large well-developed trees; but the vigour soon ceased, and the trees began to die off, and those in more favoured spots that did not die bore but scanty crops of fruit of small size and inferior quality.

The "Mahaleb" cherry of English shrubberies is much used in Britain and on the Continent as a dwarfing stock. Why cultivators should have selected this stock is a matter of surprise, as with us its dwarfing capabilities are not manifest. It rather induces a vigorous growth for awhile, and then the trees die out; this happens when the "Duke" and "Kentish" classes of cherries are worked upon it and they are the classes specially recommended for this stock. The old cherry stock in use from the foundation of Victoria and now in general use, is the best stock known here. It is, as all growers know, a small red cherry, ripe just before Christmas; it is a good cooking variety, and pleasant to eat. It is one of the "Montmorency" section, much like a "Kentish." It is, however, not faultless; it throws up abundance of suckers, and for this reason is somewhat troublesome; still I believe it is the best stock for cherries. It is not generally known or recognised that the fact of this stock not keeping pace with the kinds worked upon it is its great virtue. It acts upon the scion

as the quince does upon the pear and the "Paradise" upon the apple. It is because the scion overgrows the stock that the tree becomes so fertile and its fruits so fine; in fact, it is a dwarfing stock. This stock, as far as my experience goes, is adapted for every variety of cherry.

Pear.—As with the peach, so with the pear; the stock most generally adapted for the pear is the seedling pear stock, raised from the hardiest known kinds, which, as a rule, seed very freely and produce good stocks. As is usually the case with most fruits, the finer kinds do not produce much seed, and stocks raised from such are not generally robust. But where one seed is saved from pears of delicate constitution, hundreds are saved from hardy kinds, so that, generally speaking, hardy stocks are used.

I would advise that pear suckers never be used; if they are they will prove a great disappointment. In the early days, when seedlings were scarce, resort was had to suckers, and, as a matter of course, it was only from trees that suckered abundantly that any quantity was obtained. Trees from these were planted out, and the results were disastrous. Not only were thousands of useless suckers thrown up, but the trees refused to bear, though the same kinds on the seedling pear bore regularly and heavily. The trees on suckers had to be rooted up as entirely worthless. As a rule, and in most localities, the seedling pear stock is the most desirable for pears.

There is also a variety of quince, a kind of small "Angers," which is used most successfully, and upon which some kinds do well, even when worked directly upon it. As there are but very few kinds of pears that do well when worked directly upon this quince, it is usually necessary to double work on the stock. First of all, work such kinds as "Beurré d'Amanalis," "Louise Bonne of Jersey," or "Beurré Diel," upon the quince; allow them to make yearling shoots, and then work upon these the desired sort, when perfect health and vigour will be attained. This mode of culture is most interesting and profitable, especially in the cooler districts of the State, where the pear-on-the-pear takes so long to come into bearing. On this quince stock fertility is attained very quickly; the trees grow comparatively slow, but fine fruit and quick returns are the results. This mode of culture wants to be better known, when it will be largely adopted in the climates referred to.

There are other stocks used for pears, such as the "Hawthorne" and "Mountain Ash," but these are not necessary or desirable where the proper kind of quince is obtainable. It has been affirmed that the pear-on-the-quince is but short-lived; this is not the case. In France there are trees of great age, where this system of culture is largely practised with most satisfactory results; likewise in various parts of Victoria, where they have been planted for many years, they will be found bearing heavy crops of good fruit each season.

THE UTILISATION OF SEAWEEDS FOR MANURIAL PURPOSES AND IN OTHER INDUSTRIES.

By C. F. JURITZ, M.A., D.Sc., F.I.C., Senior Government Analyst.

The attention of the Government was directed by letter, some time ago, to the fact that all along the north-west coast of this Colony immense quantities of seaweed were continually being deposited, and it was suggested that, as great distress prevailed amongst the inhabitants of the districts adjoining, a few kilns should be built at the most readily available positions, and instruction given how to set to work in order to reduce the seaweed to ashes in the most approved way, so as to render it of commercial value.

In this connection the writer of the communication above alluded to pointed out that for four centuries the inhabitants of the Channel Islands had gained a fair living by gathering and kilning seaweed, selling the ashes as manure, which manure had been largely used in the British Isles, on the Norwegian and French coasts,* and in America. Enquiries were made regarding the size of kiln that would be required for this purpose and the probable commercial value of the ashes on delivery in Cape Town. It was suggested that, if a trial were made and fair success obtained, the production of such a fertiliser may become a standing industry for the barren regions of the north-west; the collection of seaweeds for such a purpose, it was argued, should be sufficiently remunerative for a destitute population to engage in if it paid people voluntarily to follow out such an occupation on the European shores.

Dr. E. A. Nobbs, as Agricultural Assistant in this department, to whom the matter was primarily referred, regarded it as deserving of enquiry and consideration, since seaweed was ordinarily considered a more valuable fertiliser than stable manure. He quite rightly pointed out, however, that the value of seaweed ash varied greatly, and depended entirely upon the composition of the article. That it often contained much potash and small amounts of lime and phosphates was undoubted, but in addition there were present various, and possibly, in some cases, harmful alkaline salts. The very practical questions of collecting and burning the seaweed, and of transporting and using the product also needed consideration.

The subject was, nevertheless, worthy of thought and investigation, and it was advised that steps be taken to secure for analysis a number of samples of such classes of seaweed as could be collected in bulk. At the same time it seemed more than probable that the value of the article would not be sufficiently high to permit of its profitable transport oversea from Port Nolloth to Cape Town.

---

*In some of the French islands seaweeds and dung ashes are said to be the only manures used.

With other important investigations calling for immediate attention, there has hitherto been no possibility of entering upon the questions involved in this connection, but an endeavour will shortly be made to procure samples from the portion of the Colony above referred to, and in the meantime it may be worth while offering a few more or less general remarks on the manurial capabilities of seaweeds, and on other phases of what may be termed the seaweed industry.

Sir Humphry Davy, in his lectures on Agricultural Chemistry, about a century ago, dealt largely with the subject of manures, treating of such as were of vegetable and of animal origin, of the manner in which they served the nutrition of plants, and of the changes which they should undergo ere they could be put to such a purpose. Amongst other articles, Davy recommended seaweed as a valuable fertilising material.

It is of interest here to note that the origin of the nitric acid in the huge deposits of nitrate of soda in Chili—generally known as Chili saltpetre to distinguish the article from ordinary saltpetre or nitrate of potash—was, with a fair show of reason, put down by Nöllner to the decay of huge masses of seaweeds; such masses as form what is known as the Saragossa Sea, where the drift weed is packed together over an area more than 500 miles across. Accompanying the nitrate in these deposits are large amounts of iodine, and this element, as is well known, is an important constituent of seaweed. Furthermore, undecomposed fragments of seaweed are, it is said, still to be found amongst the deposits.

The Irish peasants are said to prefer seaweeds far above stable manure, and in the Orkney Islands too, farmyard manure used to be left to accumulate unused, on account of its inferiority to seaweed as a fertiliser. Amongst other reasons why seaweed is preferred is its freedom from insect eggs, fungi, spores and weed-seeds. In New Hampshire, where the principal manure is seaweed, it is customary to use stable manure in localities where any weed-seeds it may contain would not do much harm, reserving the seaweed for general use, and so ensuring clean culture.

Extensive use is made of seaweeds for fertilising purposes, amongst other places, along the sea coast of the United States of America, on account of the comparatively large proportions of potash contained in them. Kelp, obtained in Scotland by burning seaweed, was also largely used as a potash manure until the discovery of the Stassfurt mines opened another source of potash.

The classes of seaweed which are used for manurial purposes are many; those chiefly employed along the north-eastern coasts of the United States (i.e., New England) are apparently *Zostera marina*, which is there known as eel grass, and the *fuci*, with perhaps some *algæ*. The first named is not considered of much value, although containing about 1·33 per cent. of nitrogen. Practical experience finds a difficulty in causing it to decompose, and its straw-like structure makes it inconvenient in ploughing as well as in turning over manure heaps. Analyses of this article after air-drying, and of its ash, have yielded the following figures:—*

	Air-dry substance.	Ash.
Nitrogen	1·33	—
Potash	1·00	7·0
Phosphoric oxide	0·25	1·5

*Storer: "Agriculture in some of its relations with Chemistry." Vol. 2.

The composition of the ash does not differ greatly from many ordinary wood ashes; at the same time seaweeds often yield much more ash than wood does, a point to which reference will again be made at a later stage.

Of greater value than the eel grass are the different varieties of *fucus*, some of which are also to be found along our own coasts. These plants are, when fresh, as a rule of a very mucilaginous nature, containing a good deal of nitrogen, which becomes lost when the seaweeds decay, owing to the fact that, highly watery as they are, they practically dissolve away in the process of decay, and their fertilising constituents soak into the beach where they lie. Red wrack also (*Laminaria*), which grows wholly under water, is liable to have its more valuable salts entirely wasted away by rain during decay, and, after drying, a practically valueless mass remains. It is for this reason considered preferable to collect sea-manure freshly cut or recently cast ashore.

Nothing being thus, as a rule, gained by making compost with seaweeds or allowing them to ferment, the practice generally is to employ such articles as a green manure by way of top-dressings or to plough them into the soil while fresh, rapid decay resulting in the production of speedy effects on the crops, while, in consequence of their prolific growth, each succeeding season is likely to place ready to hand a fresh supply of seaweeds.

So rapid indeed is the growth of seaweed that at a spot on the Scottish coast where all the growing seaweed had been removed, within six months there was again a thick growth of ribbon kelp two feet long and of ordinary kelp six feet long.

Cattle are declared to thrive excellently upon the grass resulting from sea-manure, and in Jersey particularly this fact is turned to account, while parsnips and turnips are cultivated by its aid, supplemented by cow manure; for mangolds it is also largely used; to potatoes, however, it is said to impart a disagreeable flavour.* The practice is to plough the fresh seaweed two or three inches into the soil in autumn or winter, following it up in the spring by trench ploughing with 20 to 30 tons per acre of farmyard manure.

Of the New England farms—where seaweeds are used as manure over a strip of country stretching 14 miles inland—with the exception of the irrigated calcareous lands, and some farms dependent on fish manure and the manures of the great towns, the only farms that are really productive are those within reach of the storm-cast supplies of seaweed, and in spite of continuous cropping the land remains fertile. It is even recorded that grass fields dressed with seaweed manure remain green when the scantily manured fields of the interior are brown and parched. In this connection Storer, in the work already quoted, from which the foregoing details have been in great part derived, says†: "It is a general rule that highly manured land is better able to hold and to supply water to crops than unmanured land is; and it is to be presumed, also, that the constituents of the sea-manure may act to improve the capillary power of the soil. It is true, moreover, of soils that are kept in good tilth, and well stored with easily assimilable supplies of plant-food, that the roots of crops will penetrate far below the surface, and thus be in a position to get both water and food from a much larger reservoir of these commodities than can possibly exist, in times of drought, in the shallow surface soil of fields that have neither been tilled nor manured."

*The Scotch crofters, for this reason, manure their potatoes with cow dung supplemented by guano, and their oats with seaweed.

†Op. cit. vol. ii. p. 170.

Unfortunately, when the question of transport has to be considered in connection with the utilisation of seaweeds, the high proportion of water, valueless for manurial purposes, introduces a considerable item into the expenditure of haulage. Upon wet soils, moreover, a fertiliser containing so much water would be slow to decay and to yield up its fertilising components.

A few words may now be said about the chemical composition of seaweeds.

The following are analyses of mixed seaweed and of seaweed ash, taken from the United States Handbook of Experiment Station Work*:—

	Mixed Seaweed per cent.	Seaweed Ash per cent.
Water	81·50	1·47
Nitrogen	0·73	—
Potash	1·50	0·92
Lime	0·23	6·06
Magnesia	0·18	4·37
Phosphoric oxide	0·18	0·30
Sulphuric oxide	0·84	2·98
Chlorine	0·96	6·60

The *fuci*, as already observed, constitute perhaps the most valuable of the seaweeds from a manurial standpoint; when fresh they have been found to possess the following percentage composition:—

Water	70 to 80
Organic matter	18 to 24
Ash	3 to 6
Nitrogen	0·33

From seaweed, which had been completely dried, Marchand obtained from 10 to 20 per cent. of potash, whereas the ash of many woods amounts to only 1 per cent. or even less, and rarely rises above 10 per cent.

The ash of *fuci* contains, in 100 parts:—

Potash	10 to 20
Lime	10 to 12
Magnesia	6 to 7
Phosphoric oxide	2 to 3

The following is an average analysis from numerous cargoes of the kelp or crude slag obtained by burning cut-weed, as it is called, which consists of *Fucus vesiculosus*, *Fucus nodosus* and *Fucus serratus*†:—

Potassium sulphate...	23·08%
Potassium chloride	1·45%
Sodium chloride	19·13%
Sodium carbonate	6·48%
Insoluble material	43·71%
Water	6·22%
Total potash	13·40%

*U.S. Dept. of Agriculture, Bulletin No. 15, 1893, p. 407.
†Thorpe's Dictionary of Applied Chemistry, vol. 2, p. 338.

Reference was made at an earlier stage, to the employment of seaweed as a potash manure: *Fucus digitatus*, according to Dr. Griffiths,* contains 20·66 per cent. of potash, but *Fucus serratus* only 3·98 per cent. The other analyses above mentioned show that potash is often prominently present, although lime is also supplied in fairly good proportion, and, in the fresh seaweed, nitrogen as well; it has, in fact, been said that seaweed may be looked upon as a potash fertiliser just as guano is considered a nitrogen fertiliser, and the recommendation has been made to apply it in sea coast farms at the rate of twenty to thirty tons per acre.

Amongst other crops, clover is regarded as specially favoured by potash manures, and, of the New England farms already alluded to, scarcely any show so luxuriant a growth of red clover as the lands in the immediate proximity of the seaweed-strewn Rye beach, where seaweed manure has been made use of since the first settlement of the country. What is technically termed "drift weed," that is to say, the floating plants, or those cast ashore by storms, is believed to be as a rule richer in potash than the "cut weed" which has to be detached from the rocks at low tide.

Allusion has also been made to the loss of nitrogen caused by allowing seaweeds to decay on the beach where they are cast by the waves. As already pointed out, the large proportion of water which these plants contain, and the fact that four-fifths of the remainder is soft and mucilaginous, result in a considerable shrinkage of huge heaps of seaweed in a very short time. The difficulty of transporting so bulky a mass as fresh seaweed, with its large proportion of water, useless for manurial purposes, is often surmounted by reducing the material to ash, a process which involves loss of the nitrogen which the fresh weeds contain. In Normandy and Brittany the seaweed is regularly dried and stacked for this very purpose, while in Scotland and on the Western Irish coast kiln burning is also resorted to: in the latter cases, however, the principal object of the process is to obtain the iodine and the potassium and sodium salts, which are then washed out of the ash by water, leaving behind, for agricultural uses, a comparatively valueless charred residue.

In the Channel Islands, on the other hand, the practice obtains of allowing the seaweed to dry near the shore, and stacking them, when dry, near the houses, to be used as fuel constantly kept burning on the hearths. The ash thus obtained is sold at about sixpence per bushel, and is applied to the soil at the rate of 2½ tons per acre when the wheat is sown. The ash thus applied is probably very imperfectly burnt, but Golfier-Besseyre has found that many a seaweed ash, as obtained in practice, contains up to and over 50 per cent. of water-soluble salts. These salts have yielded the following percentage results upon analysis:—

Potassium sulphate	11 to 44
Potassium chloride	12 to 35
Sodium chloride	9 to 70
Sodium sulphate	0 to 35
Sodium carbonate	0 to 15

All these varying results show how much depends upon the method of burning, the temperature, the access of air and other conditions, not to mention varieties of the seaweed itself, so that it is not possible to place a definite value upon seaweed ash, as produced by burning in kilns, based

* "Manures and their uses," p. 58.

upon the results of accurately conducted laboratory experiments. Different varieties of seaweed, moreover, yield, upon burning products of widely differing character, so that much care and experience are required in properly selecting and burning the material.

In France, the ash, even after thus leaching out with water, is still regarded as of high value for agricultural purposes, and it is stated that farmers will carry the leached out ashes thirty miles from the iodine factories where they had been treated for the extraction of iodine.

Since seaweeds are used for fertilising purposes on account of the potash which they contain, it should not surprise anyone to learn that, prior to the discovery of the Stassfurt salts nearly half a century ago, kelp, or seaweed ash, was in considerable demand for the preparation of potash salts, and at the commencement of the nineteenth century it was also the sole source of soda; and was therefore largely used in glass and soap manufacture. There were, at that time, about fifteen works in the United Kingdom, the Hebrides alone producing yearly 20,000 tons of finished products from this source. The value of kelp was then from £20 to £22 per ton. About thirty years ago the annual output of salts from kelp in the British Isles had dwindled to 7,000 tons.

The introduction of the Le Blanc process for the production of soda resulted in a practically complete cessation of the utilisation of seaweed as a source of soda, and consequently for the manufacture of soap and glass. It was then that it grew into importance on account of its potash and iodine. Simultaneously came a change in the class of seaweed collected for burning from those varieties known as "cut-weed" to "drift-weed," which, as already stated, contain more potash, and comprise the "red-wrack" *Laminaria digitata* and *Laminaria stenophylla*, which are always submerged at low water, and contain ten times as much iodine as the *fuci*.

Although the object of this paper is primarily to disseminate available information regarding the value of seaweeds as manure, it may not on that account be inappropriate to give some details with regard to the iodine which they contain. The following table, showing the average proportions of this substance contained in the kelp of different classes of seaweed gathered on the shores of Great Britain and Ireland, Denmark, Norway, and Iceland is accordingly reproduced from Thorpe's Dictionary of Applied Chemistry, Vol. 2:—

Dry Weeds.	per cent.	lbs. per ton.
Drift-weed Kelp:		
Laminaria digitata (Tangle) stem	·4535	10·158
,, ,, frond	·2946	6·599
,, *stenophylla*	·4777	10·702
,, *saccharina* (Sugar wrack)	·2794	6·258
Cut-weed Kelp:		
Fucus serratus (Black wrack)	·0856	1·807
,, *nodosus* (Knobbed wrack)	·0572	1·281
,, *vesiculosus* (Bladder wrack)	·0297	·665
Various:		
Halidrys siliquosa (Sea Oak)	·2131	4·773
Japanese edible seaweed	·3171	7·102
Humanthalia lorea (Sea laces)	·0892	1·998
Rhodomema palmata (Edible dulse)	·0712	1·594
Chorda filum (Sea twine)	·1200	2·688
Zostera marina (Grass wrack)	·0457	1·023
D'Urvillæa utilis (Falkland Islands)	·0075	·179
Macrosystis pyrifera (Falkland Islands) ...	·0308	·690

Kelp, or varec, as the French call it, is principally turned to account at the present day for the manufacture of iodine, which was sixty years ago merely a by-product of the soap industry. The vast quantities of seaweeds that are continually being cast ashore along the South African coasts would no doubt, if there were sufficient facilities, afford a considerable supply of iodine in its crude form; the English market price of this valuable substance is at present about 12s. per lb. The kilning of seaweed into kelp or varec has for many years generally had for its object the ultimate production either of iodine or of potash salts, and the resulting ash contains, per 1,000 parts by weight, from 5 to 15 parts of sodium and potassium iodides. In this connection an average amount of over 7,000 tons of seaweed has been operated upon annually.

One way in which the seaweed is worked up for the purpose is by burning it upon a bedding of heather or straw in long shallow trenches 3 feet wide and 18 to 20 inches deep. More often kilns of stonework, rectangular in shape, 6 to 16 feet long, 2 to 3 feet wide, and 12 feet high are adopted.* If properly burnt, that is to say, to a loose ash at a low temperature, this material may contain from 25 to 30 lbs. of iodine per ton, valued at perhaps as much as £15 or £17. The kelpers, however, frequently stir up the fused material with iron clants, and thus produce a dense hard slag mixed up with stones and sand, and by the great heat more than half the iodine is driven off and lost. The kelpers also imagine, quite erroneously, that loose ash will not give them sufficient weight, and in other ways they deteriorate the quality of the product already lessened by overburning, such as by causing the production of sulphides therein. What changes in chemical composition result from overburning may be seen from the following analyses from the products of Scotch works†:—

	Loose Ash.	Hard Kelp.
Potassium sulphate	12·71	13·95
Potassium chloride	18·09	17·79
Sodium chloride	6·80	14·00
Sodium carbonate	3·43	3·92
Sodium thiosulphate	·17	·75
Sodium iodide	1·48	·76
Total potash	18·32	18·77
Iodine, lbs. per ton	28·0	14·5

To obviate these defects of the kelp process another method, the char process, was introduced, in which the seaweed was carbonised in closed retorts, collecting the distilled tar and ammoniacal liquor in suitable condensers, a process which leaves behind in the retorts a porous charcoal containing all the iodine and other salts originally in the seaweed. The percentage composition of this charcoal is:—

Carbon‡	52·54
Calcium phosphate	10·92
Calcium carbonate	15·56
Magnesium carbonate	11·34
Alkaline salts	5·70
Silica, etc.	3·94

*Spon's Encyclopædia of the Industrial Arts, vol 1, p. 261.

†Thorpe's Dictionary.

‡Containing nitrogen-ammonia, 1·75.

This charcoal is easily lixiviated with water, and yields very white salts; it is also a better decolouriser and deodoriser than animal charcoal, and has therefore been used in sugar works, and for filtering purposes, as well as for the manufacture of the boiler covering known as carbon-cement. The boilers of the American liner "Paris," and of other steamships are covered with this material.

It is claimed* that in addition to the usual products the following are on an average obtained by this process for every ton of kelp: —

Volatile oil	6¼ gallons.
Paraffin oil	9 gallons.
Naphtha	3½ gallons.
Ammonium sulphate	272 lbs.
Calcium acetate	37 lbs.
Colouring matter	6½ lbs.
Pure charcoal	13 cwt. 39 lb.
Gas, approximately	4456 cub. ft.
Iodine	5 lb.

A third and still simpler method for the extraction of the alkaline salts from the seaweed has been devised; it is that of the wet process. The *Laminaria* or red seaweeds yield up 33 per cent. of their air-dry weight by simple maceration in cold water, 20 to 22 per cent. of this consisting of the potash and soda salts, together with some magnesia and the whole of the iodine that was contained in the seaweed.

The residue, after maceration, consists of what is called algulose, that is, the plant cellular structure, together with algin, a nitrogenous substance like albumen. The algin is removed by boiling the seaweed residue with sodium carbonate, leaving the algulose.

It is of interest to compare the results of the three processes in the case of 100 tons of air-dry *Laminaria*: —

Method of treatment.	Percentage utili-ed.	Crude first 18 tons.	Final main products.		Residuals.
			Salts.	Iodine.	
Kelp process ...	18	Kelp—18 tons	9 tons	270 lbs.	Kelp waste, 18 tons, valueless.
Char process ...	36	Char—36 tons	15 tons	600 lbs.	Charcoal, 36 tons Tar and Ammonia.
Wet process ...	68	Extract—33 tons	20 tons	600 lbs.	Algin, 20 tons; Algulose, 15 tons.

As the 100 tons of seaweeds used, although air-dried, still contain about 33 tons of moisture, it will be seen that there is practically no waste in the wet process; the commercial algin or sodium alginate is sold at about 2s. per lb., and like egg-albumen it can be employed for thickening colours in printing, or as a mordant, and also as a flexible varnish in dressing fabrics. The alginic acid produced from algin can easily be made into thin transparent sheets which form an excellent substitute for

*Spon: "Encyclopædia of the Industrial Arts," vol. 1, p. !

bladders in tying over bottles and jars; furthermore, it can be made into blocks, easily capable of being turned and polished, and may replace the ivory nut from which studs and buttons are produced, whilst calcium alginate comes near being a substitute for ivory itself. Not to mention many other purposes to which these algin derivatives may be turned, it will suffice to say that from aluminium alginate, by solution in ammonia a cheap waterproof varnish may be produced, and from copper alginate a similar varnish capable of resisting not only the penetration of water, but also the attacks of insects.

Algulose, the second by-product of the wet process, appears as a fine cellular tissue from which a transparent and very tough paper may be prepared. When dry it forms a hard mass, denser than ebony, capable of being turned and polished, out of which buttons, door knobs, etc., may be produced. Ordinary algulose is of very nearly the same relative weight as ebony, but the algulose prepared from tangle is heavier and more tough than any of the hard woods, besides possessing considerable elasticity.

Irrespective of the process used in preparing the seaweed, *i.e.*, whether it be burnt in open trenches, or charred in retorts or treated by the wet method, the resulting kelp, char, or water extract, as the case may be, is dealt with in similar manner, by lixiviation with water in iron vats heated by steam. The solution obtained is subsequently run off into evaporating pans, where it is evaporated and allowed to crystallise, when a crude sulphate of potash, containing 50 to 60 per cent. of the pure salt, is obtained, mixed with some sodium sulphate and sodium chloride. The liquid is next cooled in iron cylinders, when crystals of potassium chloride are obtained. Further boiling down and crystallisation then bring about the deposition of "kelp salt," which is sodium chloride containing some sodium carbonate, potassium chloride being again deposited, as before, on cooling. The latter salt thus obtained ranges from 80 to 95 per cent. purity.

All these salts, potassium sulphate and chloride, and sodium sulphate, chloride, and carbonate, used to be sold to glass and alkali makers, for reducing purposes, but this outlet has for many years been considerably diminished.

It is from the "mother liquor" as it is called, left after these repeated crystallisations, that the iodine is at length obtained by processes into which it does not seem needful to enter here.

A great deal of the iodine that is now being put on the market is produced from caliche, a crude Chili saltpetre, in which it is present in the form of sodium iodate. This, as a source of iodine, is far more important to-day than the production from seaweed; in fact the quantity of iodine exported from Iquique in 1899 was about 300 tons, or more than five times the total production from seaweeds in Great Britain and France together, more in fact, than the world's annual demand. In this respect therefore the value of seaweed has diminished.

As far as concerns the local use of seaweed, and apart from the storm-cast supplies of the North-west coast, it may be borne in mind that large quantities are thrown up on the beach in the immediate vicinity of Cape Town, for example at Grainger's Bay and Three Anchor Bay. Much of this is continually being removed by the rubbish carts of the Corporation of the City of Cape Town, and buried as so much refuse.

The City Council collects and disposes of the seaweed thrown up on the beach at Rogge Bay, and along the shore from the Canning Factory, near Mouille Point, to Three Anchor Bay. During the last half year the Council has removed from Three Anchor Bay and Grainger's Bay about 950 cartloads of seaweed, all of which has been buried in the beach.

From Rogge Bay, on an average, one load per diem is removed and placed on the railway trucks for disposal with the house refuse. Roughly it may be assumed that between one thousand and fifteen hundred tons are thus disposed of annually from these localities. Westwards of Three Anchor Bay the cleaning of the beach is under the control of the Sea Point Municipality, and east of Rogge Bay under that of the Imperial Government, while the portion between Rogge Bay and Mouille Point is controlled by the Harbour Board.

It is understood, however, that the City authorities, and probably also the other authorities named, will place every facility in the way of the removal of seaweeds from those beaches by farmers and others desiring to utilise it for agricultural purposes, and farmers' carts coming to town almost daily with produce for sale, may well return home seaweed laden instead of empty.

As regards the Namaqualand coast, it may be possible to test the value, as manure, of the seaweed ash obtained by burning in kilns of the shallow type described. There should be no difficulty about thus preparing a quantity of ash, and forwarding a bag thereof to this laboratory for chemical analysis, so as to arrive at some estimate of its manurial value.

Incidentally, it may be observed that fairly extensive deposits of Gypsum (sulphate of lime) occur in the Namaqualand Division, and if the value of this, like that of the seaweed ash, be not completely overshadowed by the cost of transport, there seems a possibility of the utilisation of these deposits in conjunction with the seaweed ash for fertilising purposes.

THE CONSERVATION OF SOIL MOISTURE.

By W. F. Sutherst, Ph.D., F.I.C., Lecturer on Agriculture, Marist Bros. College, Uitenhage, Cape Colony.

The three classes of material which go to supplying the sustenance of the vegetable kingdom are water, a certain number of mineral salts, and carbonic acid gas together with a small quantity of nitrogen; we can thus conveniently divide plant food into the three states of matter, solids and liquids, and gases. Of these the gaseous substances are beyond our control and there being an enormous quantity always present in the air, and an excess not being detrimental to plant life, our attention is thus brought to the liquid (water) portion and to the mineral matter. So it must naturally be present in a soil to ensure fertility, but it generally happens, especially in hot dry countries, that water is the factor missing, whilst in the more humid climates it is usually the reverse; it is, however, in the latter case a much more easy matter to remedy since the difference in quantities of mineral matter and water required by any crop is so enormous that whilst a few handfuls of an artificial fertiliser per acre can bring fertility to a poor soil, hundreds of gallons of water would be needed to do its work. In this country the water supply in the soil is the chief factor in farming, the soil being rich enough in all other respects, the small rainfall not being sufficient to wash out the active mineral matter, which is thus retained till sufficient water is present in contact with it to enable the plant roots to absorb it in solution. Sufficient rain falls in nearly every country to supply moisture to the area cultivated if all the rain could be brought to these spots, even if no careful methods of cultivation were indulged in, but considering for example the small portion of cultivated land in South Africa an enormous excess of rain reaches the earth without any possible chance of its being utilised. Any porous substance has the power of retaining water for varying lengths of time, the variations being due amongst other things to the drying power of the air, a dry air and strong wind being the principal factors in removing moisture; then the rate at which moisture is brought to the surface of the substance is also an important factor in evaporation. The soil consists of grains of varying sizes held together by pressure and moisture, the spaces between the grains being occupied by air in dry soils; should a large quantity of water be present, these spaces are filled with it. This is a most undesirable state of affairs, as air is essential to the decomposition of vegetable and animal remains in the soil, which supply the chief source of fertility in unmanured soils. A medium therefore must be arranged, by which each grain is coated with water and the air spaces not quite filled up as per diagrams 1, 2 and 3.

No. 1, showing soil structure by absence of moisture, No. 2 by an excess of moisture, the air being replaced by water, No. 3 the ideal structure, moisture and air present in the right proportion. The only portion of the earth's crust ever free from water is the first few inches, as on proceeding farther down moisture is sure to be reached, and if this increases

rapidly in quantity by depth, then careful cultivation can bring it to the surface or near enough to allow the roots to utilise it; should, however, the soil be comparatively dry for a considerable depth, it would be impossible to use this underground water, as an insufficient supply only could be drawn up. Recourse must therefore be made to capture the rainfall however slight, and retain it in the soil as much as possible. Just before the rainy season the soil should be ploughed, if possible, or cultivated as deeply as possible, making it more voluminous and porous; the large air spaces thus produced underground are then filled with rain which soaks into the surrounding soil, and acts as a reservoir, giving up its water slowly but surely. Rain falling on ground hardened after a hot summer runs off into the nearest sluit, and even on ordinary ploughed land only a small portion can be retained, and that being near the surface evaporates easily; so the deeper the water reservoir, the more water will be held, and also more slowly given up. A system followed rather too frequently in this country, namely that of leaving the stubble of mealies, oats, etc., in the ground is a source of great loss of soil moisture; the roots still being in connection with the short straw draws up moisture only to be evaporated uselessly from the top soil

Fig. 1.

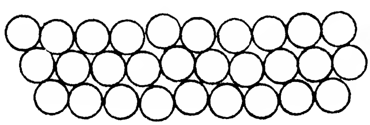
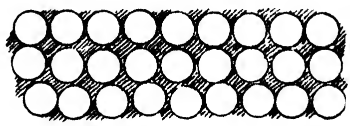


Fig. 2.



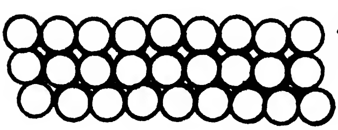


Fig. 3.

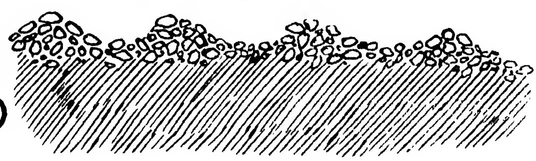


Fig. 4.

and stubbles; the soil consequently becomes hard and dry, is difficult to plough and turns over in big lumps. Should the land be broken up immediately after harvesting, the water cannot afterwards rise to the surface, the capillarity being broken, and the water remains below. The immediate ploughing of stubble after reaping, which is also important as a means of destroying weeds and noxious insects, is also a means of preserving soil moisture. Ploughing in spring tends to dry the soil, as the plough brings to the surface damp soil which soon gets rid of its water when exposed to wind and sun; so one gets a deep layer of practically dry soil, and in this the seed has to germinate, a process requiring above all a supply of water. The seeds being planted a little below the surface should with correct soil cultivation find enough moisture there, but if the above method has been applied, a dry and loose soil is present through which no water can rise, owing to the ploughing having loosened the soil structure and deprived it of its power of drawing on its underground water. If land has to be ploughed in spring, i.e. after the rainy season then it should be done as shallow as possible. The correct structure of the vertical soil profile should be so arranged that the first two or three inches are always kept in a crumbly condition, and below this the soil packed as tightly as possible without preventing the passage of the roots. The object of this is to bring up underground moisture to as near the surface as possible with the minimum of evaporation; if the soil particles are all in intimate contact, a number of fine passages are created up which the water rises by an involuntary force called capillary attraction, but if the soil is lumpy, i.e. filled

with large air spaces, and this is resting on top of the compressed soil, the water stops at the enlarged passages, as capillarity decreases with increased width of passage. The usual operation of hoeing brings about this state, and if carried out frequently, a great deal of moisture is thus saved, but this helps little if the soil underneath is in a lumpy state; to control this several implements have been devised, so-called sub-surface packers having in some dry regions brought about increased fertility by their use. They consist essentially of a number of wheels with wedge-shaped tires, placed a certain distance apart; when working on ploughed land they compress the lumps but leave a crumbly layer on the surface something like the sketch numbered 4.

It must be understood that the best condition for plant growth once obtained by the methods recommended must be kept up during the whole time, for if neglected the soil soon returns to its previous state; for instance heavy rains will soon beat down the crumbly surface to a state similar to the under portion, the water then has an opportunity to rise to the top and come under the full evaporation force of the atmosphere and winds: so not only does the underground water disappear, but also the greater portion of the rain water. So immediately after each rain the land should be harrowed.

A further method of moisture preservation, which, however, will not be employed in this country for some time to come, is the use of fertilisers which have the power of attracting and retaining moisture. Most people will have noticed that salt when exposed to the air becomes moist, and this same substance if placed in a soil would act in the same way, but though this is not used as a fertiliser, similar substances are, e.g. the potasch compounds, such as kainit, is used in large quantities in Europe. Since the soil in European countries generally contains too much water, their beneficial effect is not noticed, but when applied in dry regions they have proved to be very efficacious in preventing soil-water evaporation.

The growth of all plants depends not only upon the cultivation of the soil itself, but upon the quantity and energy of the assimilable plant foods and their producers such as bacteria, etc., and this bears a direct relation to the mechanical and physical condition of the soil. The soil is so to speak nature's laboratory, but considering that the farmer is not growing natural plants, nature must be assisted by the same modern reasons in cultivation as in the production of these artificial members of the vegetable kingdom.

CORRESPONDENCE.

The Cape Horse.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Why is it that so many admirers of the Thoroughbred are so intolerant of any other breed of horses? I have never seen so sweeping and, I may say, unfounded an assertion made as "Griqua's," when he says: "Now, if they only knew it, it is those breeders who have experimented with Hackneys, Cleveland Bays, Flemish and other like breeds, which are entirely unsuited to this country, and, as far as I am aware, to any other, who have really ruined the reputation of the South African horse." In almost every country the Hackney reigns supreme as a harness horse, and if "Griqua" will look up the records of the largest shows both in England and America, and take notice also of the thousands of grand carriage horses that throng the cities and also the country, he will find that the most ardent admirer of the Thoroughbred does not venture to question that supremacy by matching his fancy against the Hackney. I will not pursue that subject further, as surely "Griqua" does not mean the statement that the Hackney is not suitable to any other country to be taken seriously. Let us stick to South Africa and the unsuitability of any other breed than the Thoroughbred for us. To start with, at the ports and in the large towns we find an enormous number of heavy horses used for trolley work. How does "Griqua" intend to supply them? I am sure that Pearl Diver's stock will not fill the bill. For quicker harness work the demand is for a horse with action and substance, and where will you get it except from the Hackney or kindred breeds? If the demand exists, as it does, for such a horse, then by all means let breeders supply it, as where is the sense of crying down every breed except the Thoroughbred, while we are faced by the fact that 80 per cent. of the harness horses used in the towns are imported, mostly from South America, and are certainly not Thoroughbreds. I have had a certain amount of experience of driving both pure-bred and crossed Hackneys, and have never found the troubles mentioned by "Griqua"; in fact I have always found them thoroughly staunch and reliable, and, best of all, really good-tempered in harness. Instead of making vague charges against them, will "Griqua" give me any specific cases of Hackneys he has used that have thrown out curbs, splints, etc., and developed laminitis after a hard day's work. "Griqua" instances cavalry regiments; surely he does not mean to infer that cavalry regiments are mounted on Thoroughbreds? He must be aware that nearly all remounts in England are bred by the farmers from cold-blooded mares that do the farm work and have a great deal of cart blood in them, mated certainly in many cases with the Thoroughbred sires; and, further, many of the best weight-carrying hunters are bred on the same lines; and, if one excludes all alien breeds, where are the farm mares to come from? If it is correct that the Thoroughbred retains his type in South Africa and in no other country without fresh blood from England, perhaps "Griqua" will explain why horses foaled south of the line receive in this country a small weight allowance from English bred horses; and also the reason that (ponies excepted) the South African Thoroughbred does not show up well on the race course in competition with the imported one—as I fail to call to mind for the last few years a South African horse's victory in, say, the Johannesburg Handicap or in many of the more important races in this country, although the South African horses mostly represent the bottom weights. I do not wish to run down the blood horse, far from it; I consider a perfect Thoroughbred to be a king among horses, and had I the means to indulge a hobby it would be that of breeding blood horses. When, however, a man gravely states that the Hackney is not suitable

to this or *any other country* and he who breeds them has ruined the reputation of the Cape horse—and that letter is endorsed by another writer, who describes it as written by "a man of long experience, keen observation and unbiassed mind"—then it is time for someone to take up the cudgels in defence of the despised breed. As a matter of fact, what has to a great extent ruined our horses is the desire of all breeders to produce "something that can gallop." Touching the above, I was some time ago looking over the stud of Thoroughbreds belonging to a gentleman in this district, who has raced with much success in Natal. We came to his stallion (now, happily for the sake of all horseflesh, dead). I asked him why he used such a three-cornered calamity? He said, "I know he hasn't a decent point about him, but his stock can all gallop, and that is all I want." When breeders will give up trying to produce weeds that can shift for a few furlongs and study symmetry and substance as well, then will the Thoroughbred regain his rightful place. This argument is borne out by both "Griqua" and Mr. Bromley in quoting "Queen's Premium" horses (it should be "King's Premium" now), as success on a race course has nothing to do with awarding a premium to a horse in England. They are judged solely by quality and shape.—Yours, etc.,

KAFFIR.

Kokstad, September 3, 1908.

Woolled Persian Sheep.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I read with interest in the last issue of the *Journal* the particulars given by a correspondent of the "American Sheep Breeder" of a lot of 126 Woolled Persian Sheep raised on his ranch near Los Angeles. Could you or any readers of the *Journal* inform me how this breed of sheep thrives in this Colony? Would you recommend crossing it with the Merino or the Cape? Is it a good enough walker for the Karroo, where sheep have to go long distances to graze? Would it be hardy enough to stand the Karroo droughts? I presume it is the same sheep as that advertised in the *Journal* by Messrs. Moss & Wardrop, of East London?—Yours, etc.,

INTERESTED.

Victoria West, September 19, 1908.

There are very few in the Colony, but they seem to thrive fairly well. Some of our correspondents may be able to supply further details.

The Divining Rod.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Regarding the divining rod, which appears to excite such interest amongst your correspondents, I have a fresh problem in connection with same to put before them to solve. The other day I was divining for water on a neighbouring farm, the owner of which has often told me that the rod was useless in his hands, but after some persuasion he held the rod whilst I clasped his wrists. Lo and behold the rod at once twisted around and pointed to the ground; try as he would he could not hold it up. But the strangest part is that, after, when he tried himself without my aid, the rod worked freely, even more so than in my hands. He had often tried the rod before, and people had held his wrists as I did, but without the slightest result.

The "rod" we used was a thin reed, which is often found growing above underground water, about 18 inches in length and bent in the shape of the letter U. I might add that I am in no way an expert in water divining, only having found a short while ago that it would work with me.—Yours, etc.,

A.G.L.

Schoombie, C.C., September 12, 1908.

Flies on Ostriches.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—As I am quite a new chum at ostrich-farming I would be pleased if some of your readers would give me some advice on the following matter. I notice that my breeding birds are continually being pestered with flies, mosquitoes and such like, which, I think, does them a lot of harm. Could anyone suggest a simple and effective remedy for this?—Yours, etc.,

IGNORAMUS.

Schoombie, September 14, 1907.

A dust bath, made up with dry wood ash and a little sulphur, left for the birds to use, helps a good deal. Some farmers dip their birds, but this requires a specially-constructed tank. Others spray them. Correspondence on the subject is invited.

Tank Water in the Open.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Kindly inform me through the medium of your valuable *Journal* if you consider water standing exposed to the sun, say, in a stone mason tank, injurious to stock. If so, it would be a very simple matter to put a roof on same and so protect it from the sun's rays, and at the same time stop dust from getting in.—Yours, etc.,

F. E. ASPINALL.

Kuruman, September 15, 1908.

The only harm the sun will do is to raise the temperature of the water and cause it to evaporate. It may become injurious to stock if left standing too long without being changed, from contamination and decomposition of matter that gathers in it.

A Marvellous Turkey.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Having decided to give up rearing turkeys, I did away with my cocks about two months ago. About a fortnight back I found one hen hatching on fourteen eggs, and as I required her for hatching fowl eggs, I took out the turkey eggs after they were hatching for about fourteen days. As I fully believed they were unfertile you can imagine my surprise on opening the eggs a few days later to find that they all had big chicks in them. Being quite positive that she was never near a turkey cock for fully six weeks before she started laying, I would deem it a favour if anyone could explain the matter, who may know more about turkey rearing than myself.—Yours, etc.,

J. D. DE WET.

Zandvliet.

The Destruction of Field Mice.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In reply to Mr. J. J. Botha, of Mooifontein, Kokstad, *re* the destruction of field mice, many years ago the writer, who was very much pestered with mice in a young plantation by barking the trees, tried every known remedy without success. At last driven to despair he tried pumpkins pips dipped in a solution of arsenic. This had the desired effect, and in a very short time there was not a mouse to be seen. He also tried them about his stores with the same marked results. Mice

have a great partiality for pips of any kind, and no matter how abundant other food may be I have invariably found that they will be tempted by them. The only danger is leaving them about where fowls, pigs or children may get them.—Yours, etc.,

E. R. BRADFIELD.

Rondebosch, 28th September, 1908.

More about Bee Pirates.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—It is with the greatest pleasure that I read continually in the *Journal* of the great interest some people are taking in bees; one of the most shrewed little animals created by God, and yet powerless against its enemy, the bee pirate, which is not only smaller than the bee itself, but, as far as I have been able to investigate it, is also without a sting. Although we don't all of us eat honey, it is our duty to protect the bee, which is helpless, against its enemy, the bee-pirate. It is so annoying to me to see these pirates, usually not more than 5 or 6 in front of a hive, preventing a swarm from working during the best part of the day. It is now 40 years, when I was a youth, that I often saw my father in front of a hive, with a twig in his hand, but generally he had to retire after the first stroke with the twig; and it is now the same. I hope the following will be useful to all friends of bees. After having tried every conceivable remedy, as for instance placing a jug of water in front of the hive, using tanglefoot, putting the hive between dense branches, also the advice of Mr. Smit of Graaff-Reinet, previously given in the *Journal,* I find that the bee pirate is too swift for all these things, but not for the slug of a No. 1 air gun. By means of that during the last 4 or 5 years I have reduced the pirates to that extent that there are no more 80 to be killed daily as used to be the case. Place your hive against a stone wall and as near to the ground as possible; usually it catches the bee just in front of the hive and the nearer to the ground it has to catch the bee the oftener it falls to the ground together with the bee, thus affording you an opportunity to kill it, of course with the bee and then you must be quick about it. I usually take a small plank, 4 or 5 inches in width, and with that I also kill many in the act of flying away from the hive with a bee; in using it you learn at the same time playing cricket. Keep your plank to the right or in the right hand and your gun in the left hand, that is when the bees are working and the pirates don't sit down often. Generally when the pirates are very troublesome the bees do not work or only occasionally a single one. And now you have a chance with your gun. Place just in front of the hive a stone or a piece of plain sheet of iron as large as a plate, in a slanting position and shoot them from a distance of three or four feet. Usually an airgun shoots at that distance an inch too low. But if the stone is in a slanting position, every shot hits and the beepirate being hard it breaks like glass. —Yours, etc.,

J. H. v. D. MERWE.

Mierfontein, 10 September, 1908.

P.S. The two bee pirates, as illustrated in your issue of the previous month by Mr. C. W. Mally, are certainly not of the kind I know of. Will you allow me to send you this year a couple of the right devils? [By all means send them along. —*Ed. Agricultural Journal.*]

Pseudo-Scorpion in Beehives.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—The insect, Mr. Bowker has been writing about in last month's issue of the *Journal,* is a very troublesome little creature, whenever it gets into a hive; but it is not often that you see them in a hive, which has been properly closed up; but in a hive with a wide open entrance or in a bee-nest in the ground as for instance a hole of an "aardvark" or an antheap they are sometimes so bad that the bees are obliged to leave the nest. Most certainly they don't eat honey, but I have often seen them hanging on one of the hindlegs of a bee; if a bee gets into one of its nippers, the insect clings to it, and I have seen it on flowers with bee and all. It once happened that, whilst looking for the queen of a swarm, which was "on trek," I noticed at least 25 or 30 bees, which had one of those scorpions clinging to their legs. Evidently the place they had come from was intolerable.

If a hive is well closed with a few small holes for the bees to pass through in working, the bees are better able to be on their guard against these insects entering the hive.—Yours, etc.,

J. H. v. D. MERWE.

Mierfontein, 10 September, 1908.

P.S. I forgot to say that when this scorpion clings to the hindleg of a bee, the last named is continually restless.

The Kalihari Melon—'Tsama.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I notice in the *D.F. Advertiser* of the 1st of August, that the Secretary for Agriculture has objections to open the Kalihari to settlers. The 'Tsama might be devoured by cattle, and then game would perish. I may say, 'Tsama lies for two years but is also very valueless if burnt. It also happens that there is no 'Tsama to be seen for two years, and yet game does not perish. Cattle, it is true, eat the 'Tsama, but the seed is left uninjured in the stomach and passes through, and the 'Tsama germinates when the time for its growth is there. The greatest pest for the 'Tsama is the Bushman and the Baboon. The firstmentioned boils water from 'Tsama; and of seeds he fills bags full. These are burnt, crushed and eaten. So it continues until no 'Tsama or cucumber is to be found and then Bushmen *treks to the water*. The baboon bites all bitter 'Tsama to pieces, selecting only the *sweet* ones. In that way baboon eats the sweet ones and the bitter ones are left rotting. The seed is very much sought for and chewed. On the other hand no broken seeds are found in the droppings of the cattle.—Yours, etc.,

J. J. L. SCHOLTZ.

Takoen, P.O. Dingle, Distr. Kuruman, 18 August, 1908.

Sheep Dip Depots.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—The following statements reported in the Debate upon the Scab Amendment Bill on the 28th July last, have only now come to our notice.

(1) That the Dip Depots did not work satisfactorily.
(2) Now that the Depots were abolished it was impossible to have any control over the carriage of dips.
(3) That the Farmers did not get the benefit of the Free Railage, the advantage being reaped by the sellers.

As we have been most largely interested in the Sheep Dip trade of the Colony for nearly forty years past, and have done everything we could to co-operate with the Government in its efforts to master Scab and in the working of the Dip Depots, and the provision of both cheap and good Sheep Dip, you will perhaps kindly permit us a few words to your readers upon these point.

We would like to say outright that we ourselves have no complaint whatever against the proceedings of any Government or Department of Agriculture. It is simply for us to conform to such laws and regulations as they may make, as we have always most cordially done and shall continue to do.

To us personally it matters but little whether there are Dip Depots and free Rail and Road transport or not.

That the abolition of the Dip Depots should be desirable in the interests of economy is a conceivable proposition, but upon what grounds can it be asserted that the Depots did not work satisfactorily, that it was impossible without Depots to control the carriage on Dips, and that the farmers never got the benefit of free Railage?

A comparison of the position before the Depots and during their operation will be helpful showing whether or not the Depots have been an advantage to the farmers.

(1) Dips were kept on hand by the manufacturers at every Depot at low fixed published prices at which any farmer could buy at 25 to 35 per cent. less than before within easy distance of his own farm wherever situate. Thus the main object of the establishment of the Depots was fully accomplished.

(2) Precisely the same control was exercised over the carriage both before and after the abolition of the Depots, and with equal success. Like declarations and certificates had to be made and presented in proof before the Government paid.

(3) *Before the Depots* farmers were entirely in the hands of sellers of Dips, and to take our own as an example the price of Cooper's Dip to farmers hovered around £3 10s. to £4 per 1,000 gallons of wash according to distance from Railway.

Under the Depots and free Railage both we and the Storekeepers agreed to take a much smaller profit, in the hope that a largely increased sale would provide compensation for the sacrifice. So the price of Cooper's Dip was reduced to £2 12s. 6d. per 1.000 gallons delivered free at every Depot and store in the Colony. no matter whether near to or far removed from a Railway Station. The Government paid all Rail and Road Carriage. These concessions gave a reduction of at least 25 per cent. to the farmers all over the Colony, and in places remote from the Railway 35 per cent. or more.

The fixed price was advertised all over the Colony and every farmer knew it and need never have paid more. There was beyond all question very great advantage to the farmer.

We are glad to acknowledge that the sacrifice of profit was largely compensated for by a considerable increase in our sales, and we hold out the hope that if we be favoured with sufficient further increases, some further reduction in price may be possible. It has always been our policy to reduce price with increased sales, for we hold that cheap and good Dip is mutually beneficial to farmers, sellers and manufacturers alike. Larger sales always permit a smaller rate of profit and lower prices.

Kindly permit us to mention one other point. Dips such as ours—called Patent Dips—and their makers are often spoken of, as they were in the Debate, as if their design were simply to prey upon the poor farmer, who would do better to use crudely prepared remedies like Lime and Sulphur and Tobacco. These undoubtedly have their value but they have also serious drawbacks. We are qualified Veterinary Surgeons, Chemists and Farmers, and have made Scab and Sheep Dip the study of our lives under all conditions throughout the Sheep-farming world, asking only a reasonable reward for our labour and that our Dip shall be dealt with upon its merits.

We have long cast in our lot with South Africa, having taken up farms in several directions in three different Colonies, and our desire is that our connection with South African Farmers should continue to be one of mutually advantageous interest and co-operation.

Those are the motives which have always regulated our dealings.—We are, Sir, Yours faithfully,

WM. COOPER AND NEPHEWS, M.R.C.V.S.

Frenchhoek Tobacco.

To the Editor, AGRICULTURAL JOURNAL.

SIR.—The reports on the recent sale of Turkish tobacco at Frenchhoek are not encouraging for the cultivation of tobacco. I don't maintain that the reports are inaccurate, but I would like to ask reporters whether all the tobacco was bad and whether in fact there was no tobacco which could test with imported Turkish tobacco.

Further I don't want to find fault with my fellow tobacco-growers. But I feel obliged to point out what will benefit them. The reports, referred to above, com plain about leaves, unfit for cigarettes, and lay the blame on Frenchhoek, while the surrounding districts are largely to blame for that. All tobaccos were on the auction sale at Frenchhoek, but they were not all grown at Frenchhoek. From surrounding districts there were bales of tobacco at that sale, marked "First Grade," and out of which bales subsequently rotten leaves were taken. Such growers commit a great mistake by not giving proper attention to their crops. They not only lose their own reputation, but also take away that of those who with large expenses apply themselves to making the tobacco-industry a success.

I am not jealous and hope the same to be the case with my fellow tobacco-growers. And therefore I advise those, who go in for it, to try and produce the best quality. And don't let them say that there is too much trouble, or expenses in producing a good article. For in such a case it would be better not to plant at all. Those, who have not good soil, I would advise not to plant.

The new tobacco-industry is like a baby, and it won't do to leave a baby to itself. It requires care and attention. I am sure good tobacco can be produced in our country, but it should be well treated.—Yours, etc.,

A. J. LE ROUX.

Scherpenheuvel, Frenchhoek, 29 August, 1908.

NOTES ON THE WEATHER OF AUGUST, 1908.

By THOMAS W. REES, B.A., LL.M., Assistant Secretary to the Meteorological Commission.

A mean pressure slightly above the average, a normal mean temperature, several severe frosts during the first half of the month, a continued deficiency of rainfall, slight falls of snow at the beginning of the month, a mean cloudiness considerably more than usual, some very destructive gales, an unusually large number of hot winds, were the most noticeable features of the weather of August.

DIVISION.	Mean Rainfall (1908).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	3·11	15	5·94	12	—2·83	— 48
South-West ...	3·32	10	3·24	8	+0·08	+ 2
West Coast ...	1·97	8	1·44	5	+0·53	+ 37
South Coast ...	2·90	9	2·16	6	+0·74	+ 34
Southern Karoo ...	0·81	3	0·85	3	—0·04	— 5
West Central Karoo ...	0·40	2	0·48	2	—0·08	— 17
East Central Karoo ...	0·39	3	0·71	2	—0·32	— 45
Northern Karoo ...	0·50	2	0·52	2	—0·02	— 4
Northern Border ...	0·14	1	0·25	1	—0·11	— 44
South-East ...	1·35	6	1·39	4	—0·04	3
North-East ...	0·86	3	1·17	3	—0·31	— 26
Kaffraria ...	0·93	6	1·22	4	—0·29	— 24
Basutoland ...	1·37	5	1·15	3	+0·22	+ 19
Orange River Colony...	0·69	2	0·69	2	0 00	...
Durban (Natal) ...	1·80	8	1·93	...	—0·13	— 7
Bechuanaland ...	0·30	1	0·36	2	—0·06	— 17
Rhodesia ...	0·00	0	0·11	1	—0·11	—100

Precipitation.—The mean rainfall for August, based on the records of 368 stations, amounted to 1·50 ins., falling on 6 days, being only 0·06 ins., or not quite 4 per cent. less than the average, and 0·47 ins. more than what fell during the preceding month. In the Colony itself the deficiency was greatest (48 per cent.) over the Cape Peninsula, closely followed by the East Central Karoo and Northern Border, with shortfalls of 45 and 44 per cent. respectively. In Rhodesia there was no rainfall during the month. The only divisions with a rainfall above the average were the West Coast with 37 per cent., the South Coast with 34 per cent., Basutoland with 19 per cent., and the South-West with 2 per cent. A consideration of the monthly totals shows that of the 368 stations, 17 had "Nil"; 96 had 0·01—0·50 ins.; 82 had 0·51—1 ins.; 70 had 1·01—2 ins.; 31 had 2·01—3 ins.; 30 had 3·01—4 ins.; 16 had 4·01—5 ins.; 5 had 5·01—6 ins.; 10 had 6·01—7 ins.; 3 had 7·01—8 ins.; 2 had 8·01—9 ins., leaving six with more than 9 inches. These were all in the Cape Peninsula, viz.:—Maclear's Beacon with 12·71 ins.; Waai Vlei with 11·97 ins.; Woodhead Tunnel with 10·80 ins.; Bishopscourt with 9·51 ins.; Newlands with 9·17

ins., and Muizenberg with 9·66 ins. On analysing the maximum amounts recorded in 24 hours, it is seen that of the 354 stations rendering the necessary data, and excluding the 17 having "Nil," 191 had 0·01—0·50 ins.; 90 had 0·51—1 ins.; 52 had 1·01—2 ins., leaving only six stations which had maxima of over 2 inches. These were Bishopscourt with 2·88 ins.; Wynberg with 2·75 ins.; Newlands with 2·61 ins.; Kenilworth with 2·42 ins.; Vygeboom's River with 2·35 ins., and Plumstead with 2·25 ins. *Thunderstorms* were not frequent, only forty-four being recorded on 11 days, more particularly on the 13th and 14th. *Hail* was noted at 11 stations on 7 days, chiefly on the 2nd. *Sleet* fell at 14 stations on 7 days. *Snow* fell on the 2nd at Barkly East and Lady Grey (Aliwal North); on the 3rd at Hogsback and Lauriston (Barkly East); on the 4th at Dontsah, Cwebe, Fort Fordyce, Glencairn, Isidenge and Tent Kop (Griqualand East); on the 9th at Tent Kop, and on the 10th at Somerville (Tsolo).

Temparature, Cloud and Wind.—The mean temperature of all stations was 54·6°, or just exactly the same as the average. Compared with the previous month it was 1·4° warmer. The mean warmest station was again Port St. John's with a temperature of 61·1°, as compared with 60·2° the previous month, and the mean coldest Disa Head (Table Mountain) with 46·4°, a difference of 13·8°. The highest mean maximum was 72·7° at King William's Town, and the lowest mean minimum 28·4° at Hanover. The warmest days were at the end of the month, viz., 28th, 29th and 30th; a few maxima were, however, noted on the 1st. The coldest mornings were those of the 3rd, 4th, 5th and 6th, more particularly on the 5th. The mean of the highest readings was 81·2°, this being 3·3° less than in the corresponding month last year, but 4·1° more than in July last; the mean of the lowest readings was 33·8°, this being 2·4° more than in August, 1907. The mean monthly range was therefore 47·4°. The highest temperature at any station for the month was 108° on the 30th at Main in Tembuland, whilst the lowest temperature recorded was 18° on the 4th at Hanover, an extreme monthly range of the enormous amount of 90 degrees. *Frosts* were not very numerous but were particularly severe during the early part of the month. They were reported from 60 stations on 24 days of the month, chiefly on the 4th and 5th. *Fogs* were only reported from 94 stations on every day of the moth with the exception of the 4th and 5th, being most numerous on the 19th, 20th and 21st.

The mean amount of *Cloud* was 43 per cent., being 9 per cent. more than usual. The amount of sky obscured was above the average over the Cape Peninsula, South-West, South Coast, Southern Karoo, and slightly so in Kaffraria. The cloudiest station was Disa Head (Table Mountain) with 70 per cent. The prevailing morning *Winds* along the coast were Easterly at Port Nolloth, South-Westerly at Cape Point, Westerly at Cape Agulhas, Cape St. Francis and Port Elizabeth, North-Westerly at East London and Westerly again at Port St. John's and Durban. Inland the wind was variable, being Southerly at Kuruman and South-Easterly at Hope Town, and North-Easterly at Kimberley, and Northerly at Murraysburg. The mean *Wind-force* on the Beaufort Scale (1—12) was 2·00, corresponding to a mean velocity of 13 miles per hour. The wind was strongest along the South Coast, East Central Karoo, and in the South-East. *Gales* were much more frequent than usual, and were at the beginning of the month (2nd and 3rd), and at the end (28th, 29th and 30th), most destructive, causing an enormous amount of damage at Graaff-Reinet on the evening of the 29th, and the whole of the 30th. The observer there states: "Strongest wind within anyone's recollection, blew during the night of the 29th, and all day on the 30th, unroofing several houses and doing considerable damage to trees, etc. One native killed." Reports of a similar nature have come in from very many other stations. *Hot Winds* were experienced at 14 stations on 7 days, more particularly on the 30th, and an *Earthquake* shock was felt on the 4th at Kokstad.

OBSERVERS' NOTES, AUGUST, 1908.

Vruchtbaar.—This has been a very good month for the fruit and vine trees, having had no excessive rains and yet the ground was always moist, just what trees require when beginning to come in bloom. Everything shows that a very good season can be expected.

Graaff-Reinet.—Strong wind within anyone's recollection blew during the night of the 29th and all day on th e30th, unroofing several houses and doing considerable damage to trees, etc. One native killed.

Theefontein (Hanover).—Frequent sharp frosts and windy days—mainly N.W. winds. Strong N. wind on 29th, increasing to a gale on 30th from N.W. and W.

Huxley Farm (Stutterheim).—Very dry and changeable, hot the one and very cold the next day. Grass very dry, and stock falling off in condition fast. Rain wanted very badly.

Hopewell (Queenstown).—Experienced terrible gale on Sunday the 30th; the most severe for many years past.

LADY FRERE.—Very high winds nearly every day during the month. Veldt very dry, no grazing for cattle. Good soaking rains required for crops, etc.

SUNNYMEADE (Albert).—The rain on the 16th ('080 ins.) was very steady and did a lot of good. The veldt is shooting out nicely; stock improving.

THIBET PARK (Queenstown).—Very dry; rain badly wanted.

KOKSTAD.—Very windy during month. Fruit trees in blossom.

TENT KOP (Maclear).—Snow on berg gradually melted during the month. Warm at end of month. Grass coming strong and early for the locality.

WANSTEAD (Matatiele).—Very few frosts during month. Warm after rains.

CARNARVON FARM.—All things considered, this month—August, 1908— has been one of the worst on record.

The gale of Sunday, 30th, is unparalled. The gale raged with great severity for about 16 hours. All the surrounding mountains were shut off from view during the whole time by the dense clouds of dust borne on by the wind.

Trees and vegetation suffered very severely. The losses among stock, however, are inconsiderable.

Crops are suffering a great deal from want of rain, in fact the crops in unirrigated lands cannot hold out for another fourteen days. These general climatic notes would be of more interest if other correspondents also gave comparative statements for other parts of the Colony. I shall at the end of the current year give tabulated statement which, if also carried out by others, should be very useful from a general farming point of view.

Year.	Rain.	Wind.	Frosts.	Cloudless Days.
1901	0·54	14	13	7
1902	0·22	22	9	3
1903	0·12	17	9	3
1904	0·29	16	19	10
1905	0·69	16	15	2
1906	0·09	21	27	11
1907	0·02	12	17	9
1908	0·21	25	10	5

EDALWINI (Rhodesia).—For the greater part of this month the days have been hot, still and hazy. Veld fires have been very numerous.

Each evening, about an hour after sundown, a cold East wind set in, increasing in velocity until midnight, and then steadily decreasing, the early hours of the day being very clear and still. There has been no precipitation in appreciable quantities. An outbreak of bronco-pneumonia has killed hundreds of sheep at Kraal adjacent, and an epidemic, like influenza, has caused the death of a number of natives.

KOKSTAD (Coyle).—An exceptionally warm month and early spring warm rains, and few and not severe frosts. The veldt is already green and stock doing well.

MOUNT AYLIFF.—After the rains there were large veldt fires, which destroyed the new grass, which was coming on strongly under the old. The subsequent dry winds, and cessation of rain, have left the veldt, where burnt, quite black. It must, however, be admitted that in a good many parts the natives have refrained from burning and as a result have some food for their stock.

TEMPERATURE, AUGUST, 1908.

STATIONS.	Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory ...	59·8	47·9	53·8	72·0	27	39·3	20
Wynberg (St. Mary's) ...	63·2	47·2	55·2	74·5	26	40·0	5 & 20
South African College ...	62·9	47·5	55·2	73·5	26	40·0	22
Groot Constantia ...	61·2	46·9	54·0	72·0	26	40·0	4
Simonstown ...	64·1	51·2	57·6	74·4	26	44·3	20
Devil's Peak ...	56·0	45·4	50·7	67·0	12	40·0	4, 5 & 9
Bishopscourt ...	62·1	47·9	55·0	73·0	12	41·0	22
Disa Head (Table Mountain)	51·6	41·1	46·4	60·0	29 & 1	35·0	4
Elsenberg (Agri. College) ...	62·3	40·7	51·5	72·7	26	33·9	20
Robertson (Plantation) ...	66·9	41·6	54·2	75·5	29	31·5	4
Danger Point ...	60·8	51·4	56·1	72·0	30	45·0	1 & 2
Port Nolloth ...	60·7	42·9	56·8	83·0	13	36·5	22
O'kiep ...	65·7	39·6	52·7	80·1	29	34·6	20
Heidelberg ...	68·4	41·8	55·1	80·0	26 & 27	32·0	5 & 6
Port Elizabeth ...	64·8	49·0	56·9	77·0	23	39·0	5
Uitenhage ...	70·3	42·2	56·2	90·0	30	30·3	5
Cape Agulhas ...	61·1	50·0	55·5	66·0	7	43·0	5
Cape St. Francis ...	62·8	49·6	56·2	69·0	23	40·0	5
Van Staaden's River ...	65·4	46·6	56·0	85·0	31	34·0	5
Mossel Bay ...	64·2	48·6	56·4	74·0	7	39·0	5
Concordia (Plantation) ...	62·7	47·4	55·0	78·2	1	37·0	5
George (Plantation) ...	63·0	42·9	53·0	77·0	1	38·0	5
Amalienstein ...	67·4	37·4	52·4	84·0	1	28·0	5 & 6
Hanover ...	69·4	28·4	48·9	80·0	24	18·0	4
Murraysburg ...	64·7	35·9	50·3	77·0	28 & 29	20·0	4
Kimberley ...	72·1	40·7	56·4	87·9	29	29·1	5
Hope Town ...	70·3	38·1	54·2	86·0	29	28·0	5
Sydney's Hope ...	65·5	45·8	55·6	90·0	30	33·0	3
King William's Town ...	72·7	43·9	58·3	94·0	30	31·0	4
Bedford ...	68·5	42·4	55·5	88·0	31	29·0	5
Stutterheim ...	68·6	43·7	56·1	88·0	30	31·9	5
Lovedale ...	68·4	42·4	55·4	92·0	30	32·0	5
East London ...	67·7	50·5	59·1	100·0	31	40·0	5
Cathcart ...	64·2	39·6	51·9	82·3	29	25·8	5
Rietfontein ...	62·7	36·0	49·4	79·0	29	23·0	5
Aliwal North ...	67·2	36·4	51·8	82·5	29	24·0	5
Port St. John's ...	71·5	50·8	61.1	97·0	31	45·0	5
Main ...	69·6	44·3	56·9	108·0	30	30·5	5
Kokstad (The Willows) ...	67·7	39·2	53·4	85·1	30	28·0	5
Mount Ayliff ...	72·2	46·9	59·5	89·0	30	35·0	5
Umtata ...	71·5	41·4	56·4	93·0	30	31·0	5 & 6
Tabankulu ...	68·1	44·6	56·3	86·5	29	32·0	5
Teyateyaneng ...	64·9	36·8	50·8	79·0	31	28·0	5
Kuruman ...	72·1	36·8	54·4	83·0	28	30·0	5
Means ...	65·8	43·4	54·6	81·2	...	33·8	...
Extremes ...	...	...	...	108·0	30	18·0	4

RAINFALL, AUGUST, 1908.

I. CAPE PENINSULA:

	INS.
Royal Observatory (*a*) 12 in. gauge	3·03
Cape Town, Fire Station ...	3·33
Do. South African College	4·56
Do. Molteno Reservoir ...	4·81
Do. Platteklip ...	6·93
Do. Signal Hill ...	2·65
Do. Hospital ...	
Sea Point, The Hall ...	3.26
Do. Attridge ...	
Camp's Bay	3·93
Table Mountain Disa Head ...	6·22
Do. Kasteel Poort ...	
Do. Waai Kopje ...	
Do. St. Michael's ...	
Devil's Peak Blockhouse ...	6·74
Do. Nursery ...	6·19
Do. Lower Gauge ...	
Woodstock, The Hall ...	4·43
Do. Municipal Quarry ...	6·02
Do. do. Nipher's Shield	6·61
Newlands, Montebello ...	9·17
Claremont, Carrigeen ...	
Bishopscourt	9·51
Kenilworth	7·86
Wynberg, St. Mary's ...	8·33
Groot Constantia	6·31
Tokai Plantation ...	5·49
Plumstead, Culmwood ...	7·04
Muizenburg (St. Res.) ...	9·66
Fish Hoek	
Simon's Town, Wood ...	6·38
Do. Gaol ...	
Cape Point	1·94
Blaauwberg Strand	
Robben Island	2·64
Durbanville	3·41
Maitland Cemetery	2·88
Tamboers Kloof	4·12
Woodhead Tunnel	8·61
Table Mountain (Lower Res.) ...	4·97
,, ,, (Maclear's Beacon)	12·71
,, ,, (Waai Vlei) ...	11·97
,, ,, (Woodhead Dam)	10·80

II. SOUTH-WEST:

	INS.
Eerste River	3·22
Klapmuts	3·31
Stellenbosch, Goal	3·78
Somerset West	4·20
Paarl	4·85
Wellington, Goal	3·65
Do. Huguenot Seminary	
Groot Drakenstein, Weltevreden	3 92
Porterville Road	3·42
Tulbagh	2·65
Ceres Road	
Kluitjes Kraal	3·98
Ceres	
The Oaks	2·37
Rawsonville	5·16
Caledon	3·08
Worcester, Gaol	1·75
,, Meiring	
Worcester, Station	

II. SOUTH-WEST (*continued*):

	INS.
Hex River	2·43
De Doorns	1·57
Karnmelks Rivier	2·43
Lady Grey, Division Robertson...	
Robertson, Gaol	1·05
Do. Govt. Plantation ...	0·63
De Hoop	
Montagu	1·40
Danger Point	3·29
Vygebooms River	7·25
Elgin Plantation	6·08
Elsenberg Agricultural College	3·01
Berg Rivier Hoek	
Wemmer's Hoek	
Roskeen	1·45
Vruchtbaar	3·45

III. WEST COAST:

	INS.
Port Nolloth	
Do. (Lieut. Barber) ...	0·28
Anenous	0·75
Klipfontein	0·88
Kraaifontein	1·00
O'okiep	0·91
Springbokfontein	1·45
Concordia	
Do. (Kraphol)... ...	
Garies	0·79
Lilyfontein	3·13
Van Rhyn's Dorp	0 74
Clanwilliam, Gaol	0·77
Do. (Downes) ...	
Dassen Island	2·05
Kersefontein	2·12
The Towers	3·14
Abbotsdale	
Malmesbury	2·18
Piquetberg	2·60
Zoutpan	
Wupperthal	1·10
Welbedacht	
Hopefield, Gaol	1·86
Algeria (Clanwilliam) ...	4·90
Cedarberg (do.)	6·75

IV. SOUTH COAST:

	INS.
Cape Agulhas	1·79
Bredasdorp	1·66
Swellendam	3·44
Potberg	
Zuurbraak	
Grootvaders Bosch	3·80
Heidelberg	1·35
Riversdale	1·90
Melkhoutfontein	
Vogel Vlei	
Geelbek's Vlei	
Mossel Bay	2·27
Groot Brak River	3·49
George	4·19
Do. (Plantation)... ...	3·91
Woodifield (George) ...	4·28
Eseljagt	
Millwood	2·59

IV. SOUTH COAST (*con.*):

	INS.
Sourflats	0·63
Concordia	4·11
Knysna	3·02
Buffel's Nek	4·28
Plettenberg Baai	2·55
Harkerville	4·44
Forest Hall	
Blaauwkrantz	5·62
Lottering	5·59
Storms River	
Witte Els Bosch	5·24
Humansdorp	3·59
Cape St. Francis	3·59
Hankey	
Witteklip, Sunnyside ...	3·62
Van Staden's, Intake ...	3·32
Do. On Hill ...	3·00
Kruis River	
Uitenhage (Gaol)	0·87
Do. (Park)	0·88
Do. (Inggs)	0·78
Armadale (Blue Cliff) ...	0·10
Dunbrody	
Port Elizabeth (Harbour) ...	2·36
Do. (Victoria Park) .	
Do. (Walmer Heights)	3·29
Shark's River (Nursery) ...	3·19
Do. (Convict Station)	2·98
Tankatara	
Centlivres	0·69
Edinburgh (Knysna) ...	1·50

V. SOUTHERN KAROO:

Verkeerde Vlei	
Bok River	
Triangle	
Touws River	
Do. (D.E. Office) ...	
Pietermeintjes	
Grootfontein	
Ladismith	1·31
Amalienstein	0·94
Seven Weeks' Poort... ...	
Calitzdorp	0·53
Oudtshoorn	0·85
Vlakte Farm	
Uniondale	1·25
Kleinpoort	0·00
Glenconnor	
Rust en Vrede	

VI. WEST-CENTRAL KAROO:

Matjesfontein	
Laingsburg	
Prince Albert Road... ...	
Fraserburg Road	0·17
Prince Albert	1·85
Zwartberg Pass	
Booi's Kraal, Beaufort West ...	
Beaufort West, Gaol ...	0·30
Dunedin	0·15
Nel's Poort	0·14
Camfers Kraal	0·31
Lower Nel's Poort	
Krom River	0·22
Baaken's Rug	0·41
Willowmore	0·57
Rietfontein	0·16
Steytlerville	0·14
Lemoenfontein	0·38

VII. EAST-CENTRAL KAROO:

	INS.
Buffels Kloof	
Aberdeen, Gaol	0·27
Do. Bedford	
Corndale	0·08
Aberdeen Road	
Klipplaat	
Winterhoek	
Klipdrift	
Kendrew, Holmes	0·37
Do.	0·30
Graaff-Reinet, Gaol ...	0·40
Do. (Eng. Yard) ...	0·37
Do. (College) ...	
New Bethesda	0·18
Roodebloem	0·50
Glen Harry	0·19
Wellwood	0·26
Do. Mountain ...	
Bloemhof	0·08
Jansenville	0·10
Patrysfontein	
Bethesda Road	
Afrikander's Kloof	
Roode Hoogte	0·40
Toegedacht	0·00
Klipfontein	0·40
Cranemere	0·27
Pearston...	0·73
Darlington	
Walsingham	
Arundale	
Doornbosch, Zwagershoek ...	
Middlewater	0·51
Somerset East, Gaol	1·75
Do. Do. College ...	
Longhope	
Cookhouse	0·90
Middleton	0·00
Spitzkop, Graaff-Reinet ...	0·51
Bruintjes Hoogte	
Grobelaars Kraal	0·30

VIII. NORTHERN KAROO:

Calvinia	0·92
Middlepost	
Brandvlei	
Onderste Doorns	
Sutherland	1·00
Fraserburg	0·67
Scorpions Drift	
Rheboksfontein	
Klein Vlei	
Carnarvon	0·18
Loxton	
Beyersfontein	
Wagenaars Kraal	
Brakfontein	0·11
Victoria West	0·36
Omdraais Vlei	
Doornkuilen	0·00
Britstown	0·01
Wildebeestkooij	0·10
Murraysburg	0·08
De Kruis, Murraysburg ...	0·14
Richmond	0·21
De Aar	
Middlemount	
Hanover...	0·07
Theefontein	0·60
Zwagersfontein	

VIII. NORTHERN KAROO (*con.*):	INS.
Philipstown	0·80
Boschfontein	
Petrusville	0·85
The Willows, Middelburg	0·11
Naauwpoort	
Middelburg (Gaol)	0·80
Do.	
Do. (Government Farm)	
Jackalsfontein	0·99
Ezelpoort	
Plaatberg	0·50
Grape Vale	0·85
Ezelfontein	
Roodepoort	
Groenkloof	
Vlakfontein	0·60
Vogelsfontein	
Plaatfontein	1·25
Colesberg	0·68
Tafelberg Hall	0·88
Rietbult (Colesberg Bridge)	
Visch River	0·64
Varkens Kop	0·45
Culmstock	0·45
Droogefontein	
Stonehills	
Cradock (Gaol)	0·72
Witmoss	0·65
Varsch Vlei	
Maraisburg	0·40
Steynsburg (Gaol)	0·42
Riet Vlei	
Hillmoor	0·68
Quagga's Kerk	
Tarkastad	0·80
Do. (District Engineer)	0·66
Drummond Park	
Glen Roy	
Waverley	0·24
Gannapan	
Montagu	
Grape Vale	
Rietfontein, Colesberg	0·48
Schuilhoek	0·79
Vosburg	0·02
Zwavelfontein	0·00
Holle River (Colesberg)	
The Meadows, Schoombie	
Cradock Station	0·72
Hartebeestefontein, Steynsburg	0·43
Hotweg Kloof, Cradock	0·23

IX. NORTHERN BORDER:	INS.
Pella	0·00
The Halt	0·00
Keimoes	
Kenhardt	
Upington	0·00
Trooilapspan	0·00
Van Wyk's Vlei	0·07
Prieska	0·00
New Year's Kraal	
Dunmurry	0·08
Karree Kloof	0·00
Griquatown	0·12
Campbell	
Douglas	0·25
Avoca, Herbert	0·33
Hope Town	0·35
Oranje River	

IX. NORTHERN BORDER (*con.*):	INS.
Newlands, Barkly West	0·13
Barkly West	0·29
Bellsbank	0·00
Kimberley (Gaol)	0·40
Do. Stephens	0·45
Strydenburg	
Rietfontein (Gordonia)	0·00
Douglas (Vos)	0·20

X. SOUTH EAST:	INS.
Melrose (Div. Bedford)	0·83
Dagga Boer	0·85
Fairholt	1·20
Lynedoch	
Alicedale	0·46
Cheviot Fells	1·62
Bedford (Gaol)	1·82
Do. (Hall)	1·68
Sydney's Hope	1·51
Cullendale	1·38
Adelaide	1·09
Atherstone	1·25
Alexandria	2·25
Salem	
Fort Fordyce	2·12
Fountain Head	
Graham's Town (Gaol)	1·22
Do.	
Heatherton Towers	0·35
Sunnyside	1·09
Vischgat	
Fort Beaufort	1·31
Katberg	2·50
Balfour	1·62
Seymour	1·28
Glencairn	1·90
Alice	
Lovedale	1·78
Port Alfred	2·45
Hogsback	2·96
Peddie	1·20
Exwell Park	
Keiskamma Hoek	1·50
Cathcart (Gaol)	0·91
Do. (Foreman)	0·93
Do.	0·72
Thaba N'doda	2·47
Evelyn Valley	4·54
Crawley	0·25
Thomas River	0·48
Perie Forest	2·31
Forestbourne	2·75
Isidenge	1·89
Kologha	1·36
King William's Town (Gaol)	0·70
Do. Do. (Dr. Egan)	1·21
Stutterheim, Wylde	
Do. Bousfield	0·86
Fort Cunynghame	0·42
Dohne	0·42
Kubusie	0·53
Quacu	0·81
Blaney	0·89
Kei Road	1·56
Berlin	1·27
Bolo	0·63
Fort Jackson	0·60
Prospect Farm, Komgha	
Komgha (Gaol)	0·97
Chiselhurst	1·17

X. SOUTH-EAST (*continued*):	INS.
East London West	0·87
East London East	1·03
Cata	2·52
Wolf Ridge	2·15
Dontsah	1·27
Mount Coke	1·15
Blackwoods	1·43
Albert Vale (near Bedford)	1·02
Cathcart Station	0·96
Huxley Farm (Stutterheim)	0·30
Amabele Junction	0·59

XI. NORTH-EAST:	INS.
Venterstad	0·56
Mooifontein	0·89
Burnley, Cyphergat	...
Burghersdorp (Gaol)	0·92
Ellesmere	...
Molteno	0·79
Lyndene	0·82
Cyphergat	0·75
Thibet Park	0·81
Sterkstroom (Station)	0·20
Do. (Gaol)	0·28
Rocklands	0·18
Aliwal North (Gaol)	1·50
Do. (Brown)	...
Do. (Dist. Engineer)	1·61
Buffelsfontein	...
Hex's Plantation	...
Poplar Grove	...
Carnarvon Farm	0·21
Halseton	0·38
Jamestown	0·86
Whittlesea	0·47
Queenstown (Gaol)	0·08
Do. (Beswick)	...
Rietfontein (Aliwal North	1·64
Middlecourt	...
Dordrecht	0·30
Tylden	0·16
Nooitgedacht	...
Herschel	2·75
Lady Grey	2·53
Lauriston	1·52
Lady Frere	0·10
Contest (near Bolotwa)	0·48
Sterkspruit	1·63
Doornkop	...
Avoca, Barkly East	...
Keilands	0·65
Palmietfontein	...
Barkly East	1·13
Blikana	...
Gateshead	...
Cliftonvale	...
Albert Junction	0·90
Queenstown (Dis. Eng'rs Office)	0·12
Hughenden	0·85
Glenwallace	0·44
Indwe (District Engineer's Office)	0·07
Bensonvale Inst., Herschel	1·79
Cathcart, Queenstown	...
Royal, Div. Albert	...
Lady Grey Station	2·29
Dordrecht (D.E.)	0·21
Stormberg Junction	0·83
Hopewell, Imvani	0·23
Sunny Meade, Div. Albert	0·80
Castle Hill, Aliwal North	1·25

XII. KAFFRARIA:	INS.
Ida, Xalanga	...
Slaate, Xalanga	...
Cofimvaba	0·50
Tsomo	0·49
N'qamakwe	1·31
Main	0·43
Engcobo	0·25
Butterworth	1·03
Woodcliff	...
Kentani	1·34
Maclear	1·10
Idutywa	0·74
Bazeya	2·09
Willowvale	0·82
Mount Fletcher	0·92
Somerville, Tsolo	1·18
Elliotdale	0·65
M'quanduli	...
Matatiele	...
Umtata	1·16
Cwebe	2·06
Tabankulu	1·15
Mount Ayliff	0·97
Kokstad	0·80
Do., The Willows	0·96
Seteba	...
Flagstaff	0·84
Insikeni	1·61
Port St. John's	1·32
Kilrush, Sneezewood	...
Umzimkulu	0·38
Mandileni	...
Wanstead	...
Cedarville	...
Maclear Station	1·12
Elliot Station	0·00
Tent Kop, Elands Height	0·99
Umzimkulu (Strachan)	0·52
Waterfall Farm (Kokstad)	0·98
Confluence, Matatiele	0·85

XIII. BASUTOLAND:	INS.
Mafeteng	1·41
Mohalies Hoek	1·63
Maseru	1·20
Teyateyaneng, Berea	1·20
Moyeni Quthing	...
Qacha's Nek	1·39
Leribe	...
Butha Buthe	...

XIV. ORANGE RIVER COLONY:	INS.
Bloemfontein	...

XV. NATAL:	INS.
Durban, Observatory	1·80

XVI. TRANSVAAL:	INS.
Johannesburg	...

XVII. BECHUANALAND:	INS.
Taungs	0·56
Vryburg	0·35
Mafeking	0·07
Setlagoli	...
Kuruman	0·25
Zwartlaagte	...

XVIII. RHODESIA:	INS.
Hopefountain	0·00
Rhodes Matoppo Park	0·00
Edwaleni	0·00

XIX. DAMARALAND:	INS.
Walfish Bay	...

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 26th September, 1908, ruling at the several centres named, is published for general information.

CENTRE.	A. Wheat per 100 lbs.	B. Wheat Flour per 100 lbs.	C. Boer Meal per 100 lbs.	D. Mealies per 100 lbs.	E. Mealie Meal per 100 lbs.	F. Barley per 100 lbs.	G. Oats per 100 lbs.	H. Oat-hay per 100 lbs.	J. Potatoes per 100 lbs.	K. Tobacco (Boer Roll) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		
Aliwal North ..	0 10 0	0 14 6	0 12 6	0 6 3	0 7 6	0 7 0	0 10 0	0 6 6	0 17 6	0 2 0	0 0 7	0 0 7	0 2 3	0 0 8	£9	15/-
Beaufort West ..	0 12 0	1 0 0	0 14 6	0 7 6	0 10 0	0 8 6	0 10 0	0 6 0	0 13 4	0 0 7	*4d., 10d.	*4½d to 5½d	0 1 7	0 1 3	£9	16/-
Burghersdorp ..	0 10 6	0 16 6	1 7 6	0 7 3	0 17 6	0 8 6	0 15 6	0 6 0	0 11 0	0 0 5	..	0 0 5½	0 1 9	0 1 0	..	..
Cape Town ..	..	..	..	..	..	0 6 0	0 5 6	0 3 3	0 18 0	..	..	..	0 1 3	0 1 0	..	..
Clanwilliam ..	0 13 9	0 14 6	0 14 9	0 9 0	0 10 0	..	0 8 0	..	0 9 6	0 0 10½	0 0 6½	0 0 7	0 1 4½	0 1 8½	£6 to £8	20/-
Colesberg ..	..	..	..	..	..	..	..	0 6 0	12/- to 15/-	..	..	..	1/1 to 1/6	9d. to 1/-	..	..
Cradock ..	0 12 0	..	0 13 0	0 6 6	..	0 8 9	..	0 5 0	1 0 0	0 0 6	0 0 6	0 0 6	0 2 0	0 1 0	..	6/6
Dordrecht ..	0 9 6	0 15 6	0 14 6	0 8 6	0 9 6	0 8 0	0 9 6	0 5 0	0 15 0	0 1 0	0 0 4½	0 0 5	0 2 4	0 0 9	£8	15/-
East London ..	0 11 0	0 13 0	1 3 6	0 7 0	0 15 0	0 7 6	0 7 0	0 5 6	0 12 0	0 1 0	0 0 4	0 0 4	0 2 6	0 1 0	£10	19/-
Graaff-Reinet ..	0 12 0	..	0 13 0	0 7 0	..	0 8 0	..	0 6 0	0 10 0	0 0 3	0 0 5	0 0 5	0 2 0	0 1 0	£12	12/6
Grahamstown ..	..	..	..	0 7 6	..	0 8 6	0 11 6	0 5 6	0 13 9	0 0 6	0 0 6½	0 0 6½	0 2 3	0 1 0½	..	..
Kimberley ..	0 10 0	0 16 0	0 13 9	0 6 0	0 6 9	0 5 11	0 6 6	0 4 10	0 14 8	0 0 5	0 0 7½	0 0 6	..	0 0 8	£9	11/9
King William's Tn..	0 10 0	0 17 0	0 14 0	0 7 0	0 8 0	0 7 0	0 9 0	0 4 0	0 13 0	0 0 6	0 0 6	0 0 6	0 2 0	0 0 9	£15 1s.	20/9
Malmesbury ..	0 10 0	0 15 6	0 11 0	0 8 0	0 9 0	0 7 0	0 6 0	0 3 0	1 0 0	0 3 0	0 0 6	0 0 6	0 1 3	0 0 9	£9	19/-
Mossel Bay ..	0 14 0	0 14 0	0 15 0	0 7 6	0 8 0	0 8 0	0 7 0	0 4 6	0 14 0	0 0 6	0 0 7	0 0 8	0 1 4	0 0 7	..	..
Port Alfred ..	0 12 0	0 18 0	0 15 0	0 8 0	0 10 0	0 8 0	0 10 0	0 5 0	0 12 0	0 0 9	0 0 6	0 0 9	0 1 9	0 0 6	..	..
Port Elizabeth ..	..	..	..	0 7 0	..	0 7 6	..	0 4 9	1 2 6	..	0 0 6½	0 0 6½	0 1 9	0 0 11	..	..
Queenstown ..	0 10 0	0 15 6	0 13 0	0 6 9	0 8 0	0 10 0	0 10 0	0 4 9	0 13 6	0 0 7	0 0 5	0 0 6	0 2 3	0 0 10	£12 to £14	18/- to 22/-
Tarkastad ..	0 14 0	0 10 6	0 16 0	0 8 0	0 10 0	0 8 0	0 8 6	0 7 6	0 7 0	0 1 0	*0 0 5	*0 0 5	0 2 0	0 1 6	£10	20/-
Vryburg ..	0 15 0	0 17 6	0 16 0	0 8 0	0 9 0	0 11 0	0 11 0	0 3 0	0 14 0	0 0 8	*5d. to 9d. †5d. to 9d.	*5d. to 6d. †5d. to 6d.	0 1 6	0 1 0	£8 to £12	12/6 to 17/6
Worcester ..	0 10 6	0 15 6	0 12 6	0 8 3	0 9 3	0 7 0	0 6 7	0 3 0	0 10 6	0 0 5	4d. to 8d.	0 0 5	0 1 3	0 0 8	£6 to £10	18/- to 23/6
Johannesburg ..	0 9 9	..	..	0 11 6	..	..	0 6 6	0 5 9	0 14 6	..	3d. to 4d.	1½d. to 5½d.	..	0 2 0	£9 to £15	12/- to 23/-

NOTE.—A blank space denotes "no transactions."   * Colonial.   † Frozen-

PRODUCE MARKETS.

CAPE TOWN.

Mr. R. Müller (Produce Department), reports for the month of September :—

Ostrich Feathers.—The Market has been fairly well supplied with the usual average assortment. For superior quality in all classes the Market continues firm; but common, stalky and narrow Feathers remain neglected. Farmers and Dealers should remember that there is a very marked difference in the prices between *Ordinary* and *Good Quality* Feathers. Dealers will do well to bear in mind, that exporters will not pay extravagant prices for common goods.

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
Super Primes ...	15	0	0	35	0	0	Floss	0	5	0	1	15	0
First, ordinary to Super	10	0	0	14	0	0	Long Drabs	2	0	0	3	10	0
Seconds	5	0	0	9	10	0	Medium Drabs ...	0	15	0	1	10	0
Thirds...	3	0	0	4	0	0	Short to Medium ...	0	5	0	0	5	0
Femina Super ...	10	0	0	15	0	0	Floss	0	5	0	1	15	0
Do., Seconds to Firsts	3	10	0	9	10	0	White Tails	1	0	0	2	10	0
Byocks (Fancy) ...	5	0	0	9	0	0	Coloured Tails ...	0	5	0	1	10	0
Long Blacks	3	10	0	7	0	0	Chicks...	0	1	0	0	2	0
Medium Blacks ...	1	10	0	3	0	0	Spadonas	2	0	0	3	0	0
Short to Medium ...	0	10	0	1	15	0	Inferior Black and Drabs, short to long	0	0	6	1	10	0

Wool.—During the past month our local sales have increased considerably and a fair number of new season's clips have been offered, a good many of which showed style and quality. The demand continues firm for light conditioned. Combing Grease, but earthy and mixed lots remain difficult to move. Some nice parcels of Roggeveld Wool were offered, prices for which ranged from 6¼d. to 7½d., according to quality. Malmesbury light from 5¼d. to 6d., heavy from 4½d. to 5¼d. Long Karoo from 5½d. to 6½d., Medium from 4½d. to 5¼d. Heavy and waste Lots from 3¾d. to 4¼d.

	s.	d.	s.	d.		s.	d.	s.	d.
Super long Grass Veld ...	0	7	0	7½	Wool for Washing	0	4½	0	5½
Do. Karoo	0	5½	0	6¾	Snow-white Super to Extra	1	4	1	7
Medium	0	4	0	5	Do. Ordinary ...	1	1	1	4
Short and inferior	0	3½	0	4	Fleece Washed	0	0	0	8

Mohair.—The Market remains unchanged. Superior Summer Firsts may be quoted from 10½d. to 11d., Ordinary from 8½d. to 9½d. Super Kids from 15½d. to 16½d., Ordinary from 12d. to 13d. Mixed Lots and Seconds from 6d. to 8d. Some fairly large transactions have taken place in England in Clips of good quality Long Hair. Manufacturers are neglecting short stapled Mohair and I would strongly advise Angora Goat Farmers to bear this in mind.

	s.	d.	s.	d.		s.	d.	s.	d.
Firsts, Summer	0	8½	0	11	Winter	0	6	0	7½
Kids	1	0	1	4½	Do. Kids...	0	11	1	0
Seconds	0	5½	0	6					

Hides and Skins.—I am pleased to be able to report a firm Market. Hides have advanced considerably. Sheep Skins are firmer in Long Wools, while Light and Heavy Goat Skins have advanced from ½d. to 1d. respectively.

	s.	d.	s.	d.
Long woolled Skins ...	0	4½	0	5½
Short	0	3¼	0	3¾
Shorn	0	2¾	0	3
Bastards	0	2¾	0	3
Cape Skins, each	1	4	1	9
Do., cut, each ...	0	0	1	0
Goat, heavy to light ...	0	8	1	0
Sundried	0	0	0	5
Angoras	0	0	0	4¼
Sundried Hides	0	5	0	7¼
Salted	0	4½	0	6
Wet	0	3	0	3¼

PORT ELIZABETH.

Messrs. John Daverin & Co. report under date September 25 :—

Ostrich Feathers.—Only one and a half days sale was held this week, when the usual average assortment was put forward. Competition was wanting and prices generally very weak, but without any quotable decline. The total quantity sold amounted to £4,717 16s. 2d., and weighed 2,614 lbs. 13½ onzs. The London Sales open on Monday next, when about £220,000 value will be offered; the result is anxiously awaited by both buyers and sellers.

	£	s.	d.		£	s.	d.
Primes: Extra Super	Special Prices.						
Good to Super ...	14	0	0	to	25	0	0
Whites: Firsts ...	10	0	0	„	14	0	0
Seconds ...	5	0	0	„	9	0	0
Thirds ...	0	10	0	„	3	0	0
Feminas: Super ...	9	0	0	„	14	0	0
Firsts ...	6	10	0	„	9	0	0
Seconds ...	3	10	0	„	6	10	0
Thirds ...	0	5	0	„	2	0	0
Greys ...	1	10	0	„	6	0	0
Fancy	3	10	0	„	8	0	0
Tails: White	0	10	0	„	2	15	0
Light	0	10	0	„	1	15	0
Coloured & Dark	0	1	0	„	0	15	0
Blacks: Long	2	10	0	to	6	0	0
Medium	1	0	0	„	3	0	0
Short .	0	5	0	„	1	0	0
Wirey .	0	0	3	„	0	0	6
Floss .	0	5	0	„	1	15	0
Drabs: Long... .	1	0	0	„	3	5	0
Medium .	0	12	6	„	1	10	0
Short... .	0	2	6	„	0	6	0
Wirey .	0	0	3	„	0	0	6
Floss... .	0	5	0	„	2	0	0
Spadonas: Light .	0	5	0	„	3	0	0
Dark .	0	2	6	„	1	10	0
Chicks...	0	0	3	„	0	1	0

Wool.—The Antwerp Sales opened firm, which augurs well for the London Sales next week. Our Local Market continues firm, and a fair amount of business has been done in the open market during the week at full current prices, our sales being the most important. On the Public Market a limited quantity was offered, prices being unchanged. Rather a large quantity will be offered at the London Sales opening next week, and the result is looked forward to with interest.

Snowwhite, Extra Superior ...	17d	to	17½d
Do. Superior	16d	„	16½d
Do. Good to Superior...	15d	„	15½d
Do. Inferior Faulty ...	13d	„	14d
Grease, Super Long, well-conditioned, Grassveldt grown (special clips) ...	7d	„	7½d
Do. do. do. ...	6d	„	6½d
Do. do. Karoo grown (special clips)	6½d	„	7¼d
Do. do. do. ...	5½d	„	6¼d
Do. do. Mixed Veldt...	5½d	„	6½d
Do. Light, faultless, medium Grassveldt grown ...	5½d	„	6d
Do. do. Karoo grown	5½d	„	6d
Do. do. short, do.	4½d	„	5d
Grease, Coarse and Coloured ...	1½d	to	3d
Scoured do. do. ...	2d	„	9½d
Basuto Grease, short	5d	„	5½d
O.R.C. Grassveldt Grease, long & well-conditioned (special clips)	6d	„	6¾d
Do. do. do. ...	5¼d	„	5¾d
Do. do. medium grown, light, with little fault	5d	„	5½d
Do. do. short, faulty & wasty	4¼d	„	5d
Do. do. Karoo grown, long & well-conditioned ...	5¼d	„	6d
Do. do. medium grown, light with little fault ...	4d	„	4½d
Do. do. short, faulty and wasty...	4d	„	4¼d

Mohair.—This market remains firm, but owing to small stocks the amount of business done in the open market during the week has been small. On the public market on Tuesday a fairly large quantity was offered, and prices showed no change from last week. Up to the present very little Winter Hair come in, and so far the market is quiet for this description, but we hope soon to see a more active enquiry.

Super Kids	**15½d**	**to**	**16½d**
Ordinary Kids and Stained ...	**12d**	**„**	**13d**
Superior Firsts, special clips	**10½d**	**„**	**11d**
Ordinary Firsts...	**8½d**	**„**	**9½d**
Short Firsts and Stained ...	**7d**	**„**	**7d**
Superfine Long Blue O.R.C. Hair	**8d**	**„**	**8½d**

Mixed O.R.C. Hair (average)	**7½d**	**to**	**8½d**
Do. very mixed ...	**6d**	**„**	**6½d**
Seconds and Grey	**5d**	**„**	**6d**
Thirds	**4d**	**„**	**4d**
Winter Kids, special clips ...	**12d**	**..**	**12d**
Do. good ordinary ...	**10d**	**..**	**11d**
Winter Hair	**8d**	**..**	**8½d**
Basuto Hair	**8½d**	**..**	**8½d**

Skins are firm. Sheepskins in bundles, 4⅞d.; Pelts, 3½d.; Capes, 15d.; damaged, 4d. each; Goatskins, 10⅝d.; damaged, 5d. per lb.; Angoras, 5½d.; Shorn, 3⅝d.; damaged, 2⅝d. per lb.; Springbok, 8d. each; Johannesburg Sheep, 4⅞d.; Goat, 7½d.; Angoras, 4½d.

Hides.—Sundried, 7½d.; damaged, 6½d.; Salted, 6½d.; damaged, 5½d.; Thirds, 3½d.

Horns.—3½d. each all round.

APPLICATIONS FOR AGRICULTURAL EMPLOYMENT.

Youth, inexperienced, now in England, is desirous of obtaining employment on a farm in this Colony. Reply to A. PEARSON, 13, De Lorentz Street, Cape Town.

Employment on a stock farm wanted for the purpose of learning. Willing to be apprenticed. Reply E. S. ABBOTT, P.O. Box 255, Cape Town.

Elsenberg student shortly leaving college, having completed his course, is desirous of employment as under-manager on a good stock farm within about 100 miles of Cape Town. Would accept a small salary. Speaks Dutch fluently. About 19, strong, healthy and not afraid of hard work. Reply IVOR J. EDWARDS, Elsenberg Agricultural College, Mulder's Vlei.

Elsenberg student, completing full course at end of session, desires employment on a farm (ostrich farm preferred). Would accept a small salary as a beginning. Reply HERBERT WOOF, Elsenberg Agricultural College, Mulder's Vlei.

Elsenberg student, completing full course at the end of the year, seeks employment on farm. Fruit or dairying preferred if possible. Reply RICHARD B. COOK, Elsenberg Agricultural College, Mulder's Vlei.

MILK RECORD

ELSENBURG COLLEGE HERD.

Subjoined is the Milk Record to the 30th September, 1908 :—

Breed and Cow.	Days in Milk.	Yield in Lbs. During September.	Yield in Lbs. Total to date.	Yield in Lbs. Daily Average.
FRIESLANDS.				
Cleopatra	223	828	8,937	40·0
Romula	198	804	6,241	31·5
Victoria	188	998	6,248	33·2
Bell	82	1,261	3,436	41·9
Violet	62	1,169	2,373	38·2
Rose	41	1,433	1,790	43·6
JERSEYS.				
Nora	243	524	4,263	17·5
Gladys	142	764	3,398	23·9
Gertie	104	772	2,759	26·5
Rosa	82	503	1,557	19·0
Grace	76	636	1,666	21·9
Gwendolen	45	477	636	14·1
Gilliflower	33	1,009	1,103	33·4
AYRSHIRES.				
Cherry	125	448	3,068	24·5
Lobelia	100	649	2,697	26·9
Queen Dot	92	628	2,432	26·4
SHORTHORN.				
Maggie	82	1,079	3,059	37·3
CROSSES.				
Bessie	323	824	10,748	33·2
Disa	198	526	4,353	22·0

SECOND EGG LAYING COMPETITION.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

RECORD FOR SEPTEMBER, 1908, AND TOTALS TO END OF SEPTEMBER.

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date. Eggs.	Total per Pen to date. Weight ozs.
1	C. H. van Breda	White Leghorns	1	24	$46\frac{5}{16}$		
			2	20	$38\frac{9}{16}$		
			3	23	$39\frac{6}{16}$		
			4	19	$38\frac{8}{16}$	324	$603\frac{3}{8}$
2	F. Muller ...	Black Minorcas	5	19	$41\frac{1}{16}$		
			7	5	$11\frac{4}{16}$		
			8	14	$28\frac{12}{16}$	98	$207\frac{9}{16}$
3	H. Chas. Starke	Buff Orpingtons	9	17	$31\frac{14}{16}$		
			10	11	$22\frac{14}{16}$		
			11	18	$34\frac{8}{16}$		
			12	10	$21\frac{8}{16}$	186	$356\frac{3}{4}$
4	J. W. Wright ...	White Wyandottes	13	21	$40\frac{5}{16}$		
			14	8	$14\frac{8}{16}$		
			15	18	$41\frac{8}{16}$		
			16	23	$48\frac{14}{16}$	149	$310\frac{15}{16}$
5	C. H. van Breda	White Leghorns	17	21	$40\frac{8}{16}$		
			18	23	$43\frac{2}{16}$		
			19	20	$42\frac{1}{16}$		
			20	18	$34\frac{8}{16}$	349	$676\frac{1}{16}$
6	F. T. Hobbs ...	Silver Wyandottes	21	16	$27\frac{6}{16}$		
			22	15	$29\frac{9}{16}$		
			23	16	29		
			24	21	$38\frac{5}{16}$	134	$246\frac{3}{16}$
7	H. D. Bradley...	Silver Wyandottes	25	13	$27\frac{1}{16}$		
			26	14	$27\frac{12}{16}$		
			27	17	$30\frac{6}{16}$		
			28	14	$26\frac{13}{16}$	182	$318\frac{13}{16}$
8	J. G. Lay ...	White Leghorns	29	25	$47\frac{3}{16}$		
			30	19	$39\frac{6}{16}$		
			31	17	$37\frac{4}{16}$		
			32	22	$40\frac{6}{16}$	255	$510\frac{15}{16}$
9	C. H. van Breda	White Leghorns	33	20	$37\frac{11}{16}$		
			34	24	$47\frac{7}{16}$		
			35	20	38		
			36	22	$42\frac{4}{16}$	297	$569\frac{9}{16}$
10	R. Johnston ...	Buff Orpingtons	37	14	$28\frac{3}{16}$		
			38	15	$26\frac{6}{16}$		
			39	12	$20\frac{14}{16}$		
			40	10	$18\frac{9}{16}$	169	$313\frac{7}{16}$

RECORD FOR SEPTEMBER, 1908, AND TOTALS TO END OF SEPTEMBER—*cont.*

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date.	
						Eggs.	Weight ozs.
11	S. Smith ...	Silver Pencilled Wyandottes	41	20	$35\frac{8}{16}$		
			42	12	$18\frac{7}{16}$		
			43	15	$26\frac{4}{16}$		
			44	11	$18\frac{6}{16}$	156	$262\frac{1}{16}$
12	(Vacant).		...	...	...	...	...
13	S. Smith ...	Brown Leghorns	49	22	$41\frac{11}{16}$		
			50	9	16		
			51	20	$35\frac{15}{16}$		
			52	20	$36\frac{13}{16}$	178	333
14	Clifford Hoole...	Black Minorcas	53	19	$37\frac{9}{16}$		
			54	22	$33\frac{3}{16}$		
			55	20	$34\frac{10}{16}$		
			56	18	$32\frac{15}{16}$	318	547
15	S. Smith ...	White Leghorns	57	23	$43\frac{10}{16}$		
			58	20	$35\frac{13}{16}$		
			59	22	44		
			60	21	$38\frac{5}{16}$	321	$589\frac{3}{4}$
16	S. Smith ...	White Leghorns	61	20	$34\frac{5}{16}$		
			62	17	$31\frac{5}{16}$		
			63	9	17		
			64	21	$36\frac{12}{16}$	296	$520\frac{7}{16}$
17	W. R. Allen ...	White Leghorns	65	20	$34\frac{8}{16}$		
			66	15	$33\frac{1}{16}$		
			67	19	$37\frac{14}{16}$		
			68	19	$40\frac{12}{16}$	186	$369\frac{1}{8}$
18	S. Smith ...	White Wyandottes	69	13	$23\frac{12}{16}$		
			70	20	$35\frac{14}{16}$		
			71	14	$29\frac{10}{16}$		
			72	17	$32\frac{8}{16}$	214	$408\frac{1}{16}$
19	R. W. Hazell ...	Blue Andalusians	73	21	$42\frac{9}{16}$		
			74	18	$34\frac{6}{16}$		
			75	24	$45\frac{10}{16}$		
			76	16	$32\frac{3}{16}$	229	$438\frac{3}{4}$
20	Clifford Hoole...	Brown Leghorns	77	18	33		
			78	15	$27\frac{4}{16}$		
			79	19	$34\frac{13}{16}$		
			80	23	$40\frac{11}{16}$	266	$474\frac{3}{4}$
21	R. W. Hazell ...	White Wyandottes	81	11	$22\frac{15}{16}$		
			82	Dead			
			83	22	$47\frac{11}{16}$		
			84	25	$45\frac{8}{16}$	162	$318\frac{13}{16}$
22	S. Smith ...	White la Bresse	85	14	$23\frac{14}{16}$		
			86	12	$22\frac{14}{16}$		
			87	17	$30\frac{1}{16}$		
			88	13	$23\frac{12}{16}$	205	$362\frac{15}{16}$
23	R. J. Williams	Black Minorcas	89	15	$32\frac{6}{16}$		
			90	19	$38\frac{10}{16}$		
			91	19	$40\frac{1}{16}$		
			92	11	$23\frac{10}{16}$	120	$244\frac{5}{8}$

BEE-KEEPERS

Buy your **HIVES** and **FOUNDATION**

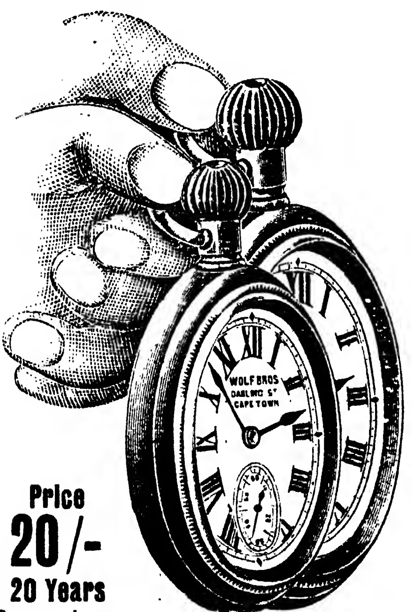
— OF THE —

SOUTHERN APIARIES CO.

AND SUPPORT *COLONIAL INDUSTRY.*

Our **FOUNDATION** is made of **COLONIAL BEES WAX,** and therefore free from the possibility of **FOUL BROOD** Spores. Made under the supervision of Mr. H. L. ATTRIDGE, Expert to the South African Bee-Keepers Association (for Cape Colony).

Address: P.O. Stikland Siding, C.C.



Price
20/-
20 Years
Guarantee.

WARNING,—The Farmer's or Working Man's Watch advertised by others at 17/6 is NOT THE SAME as ours. We will if SPECIALLY desired supply similar ones at 15/- each, Post Free.

WATCHES

FOR ROUGH WORK,

Our FARMERS' Watch

IN TWO SIZES,

AS ILLUSTRATED;

Dust and Watertight Silveroid Cases.

Price 20/-

20-YEAR GUARANTEE.

Same Watch with non-magnetic movement price **25/-.**

In Solid Silver Cases, 50/-

Other Watches, Jewellery and Fancy Goods of every description

Illustrated Catalogues (over 3000 illustrations) free on application.

WOLF BROTHERS,

SPECIAL DEPT.,

Wholesale and Retail

Watch Manufacturers and Jewellers, &c.,

54, DARLING STREET,

CAPE TOWN.

W. H. SCHOLEFIELD & CO.,

WOOL & PRODUCE BROKERS,

COMMISSION & FORWARDING AGENTS,

PORT ELIZABETH.

(Established, 1877).

WOOL, MOHAIR, OSTRICH FEATHERS and all other PRODUCE received and Sold at Highest Prices.

GOODS CLEARED AT CUSTOMS and forwarded with promptitude.

P.O Box 153. **Telegraphic Address "SCHOLEFIELD."**

THE

Agricultural Journal

OF THE CAPE OF GOOD HOPE.

No. 5. NOVEMBER, 1908. VOL. XXXIII.

Published Monthly in English and Dutch by the Department of Agriculture and distributed gratis to bona fide farmers in the Cape Colony on application through the Resident Magistrate of the District.

SUBSCRIPTION 5s. PER ANNUM. Post Free in South Africa.
Remittances to be made Payable to the Publishers CAPE TIMES, LTD., Church St., Cape Town.

Postal Address:

The Editor "Agricultural Journal," Department of Agriculture, Cape Town.
Telegraphic Address: "Bulletin," Cape Town.

CONTENTS.

B

NOTES.

Ordering Government Guano through Stationmasters.

Farmers residing in the Western and South-Western Districts of this Colony should note that, with the view of assisting them in procuring Government Guano, arrangements have been made with the Railway Department, whereby supplies of this product may be obtained direct from Cape Town, through the medium of local Stationmasters. Applications for guano, accompanied by payments in advance, may, therefore, now be placed with any of the Stationmasters within the districts herein referred to. The price of guano is £6 per ton of 2,000 lbs., or 12s. per bag of 200 lbs., including bags, delivered to the Cape Town Railway Station. All railage charges are payable by the consignee and, in the case of guano consigned to Sidings, these must be prepaid.

Redwater Vaccine.

All applications for Redwater Vaccine issued by the Veterinary Laboratory, Grahamstown, the price of which is One Shilling (1s.) per dose, must in future be made either to the Director of the Veterinary Laboratory, Grahamstown, or to Civil Commissioners, and *must be accompanied by remittances* in cash, postal orders, money orders or drafts. Cheques will not be accepted.

East Coast Fever Restrictions.

It is notified by Proclamation No. 484 that from and after the 15th November, 1908, the introduction of transport wagons and other vehicles through the Ports of Entry at Umzimkulu and Stanford's Drift shall be permitted only on production of a certificate signed by the District Resident Magistrate of Ixopo or Polela as the case may be, the stationmaster at Ixopo or Donnybrook, or a Justice of the Peace, Fieldcornet or Police Officer of either of the said Districts, to the effect that they were hauled by horses, mules or donkeys when leaving Ixopo or Donnybrook, which certificate shall be completed by the owner or person in charge showing that no horned cattle had been used before such vehicles shall be admitted through the said Ports of Entry. Proclamations Nos. 93 and 205 of 1908, are amended accordingly.

Maize in London.

Advices received to the end of October show that the London Maize Market had fallen off owing to the demand having decreased. The Argentina shipments were insufficient for the normal requirements in Europe; but owing to the crisis in Bulgaria they were shipping as fast

as they could and keeping stocks up to the mark. The imports were 198,000 qrs. as against 200,000 last year; South African maize still maintains its value. Prices, c.i.f. per qr. 480 lbs.:—La Plata, afloat, 26s. 9d.; October-November, 26s. 7½d.; South African on spot on sample, 28s. 6d.

Almeria Grapes.

The Department of Agriculture has from time to time published for the information of vine and fruit growers full particulars of the extensive trade that is being done in Almeria Grapes in British markets during several months each year, with a view to the possible development of this trade in this Colony. It was pointed out that this grape is a very hard variety, and is said to be capable of successful cultivation on very poor soils. The magnitude of the industry in Spain may be gathered from the fact that upwards of two million barrels were despatched from Almeria from the end of August to the beginning of December last year. Owing to the hardy character of the grape it can be stored for months, and as a matter of fact has been a serious competitor with Cape grapes during the past season. It is urged that if the grapes arrive in London from the commencement of March onwards they should realise from 3d. to 6d. per lb. The Almeria grapes are packed in barrels weighing gross from 60 to 65 lbs. and containing net about 48 lbs. of grapes. The packing material is cork-dust. It is suggested that if the trade is taken up at the Cape, the packing should be in boxes of measurement 20 x 15 x 10″, and containing about 25 lbs. of grapes. The shipment would be in ventilated hold and not in cold storage, and the rate would be therefore 25s .per 40 cubic feet as against 55s. in cool chamber. The total cost of packing, forwarding and selling such box is estimated at 3s. Details of the sales by auction of two lots of Almeria grapes totalling 3,391 barrels were received by last mail and the results are summarised hereunder for the further information of those who contemplate making experiments during the forthcoming season. The lots put up averaged 20 barrels with average prices of about 10s. per barrel for 48 to 50 lbs of grapes net, which would be equivalent to 5s. per box of 24 lbs. for Cape grapes packed in the special manner suggested; and with the total outlay of 3s. per box from the farm to the market would leave a balance of 2s. to the grower or about 1d. per lb. The Trades Commissioner thinks that these grapes from the Cape would realise higher prices than Spanish, but naturally this can only be determined by actual experiment. The foregoing facts are submitted to growers with no recommendation further than that they shall use their own judgment in taking up the industry and that experiments with small lots are desirable.

Trout Fishing Regulations.

The following amended Trout Fishing Regulations have been promulgated by Proclamation No. 475:—

1. It shall be lawful to fish for Trout in the Berg, Breede (excluding its tributaries the Smallebladeren and Hollesloot), Eerste, Hex, Lourens, Bot, Palmiet and Zonder End Rivers and in any of the tributaries thereof, in Verkeerde Vlei, in the Division of Ceres, and Princess Vlei, Rondevlei and Seacow Vlei, in the Cape Division, between the 1st day of October in any year and the 15th day of January in the following year, both days inclusive, in the case of rivers, and in the case of vleis between the

15th day of September in any year and the 31st day of March in the following year, both days inclusive; and in the Buffalo River, from the King William's Town Road Bridge to the junction of the Buffalo and Izeleni Rivers, together with all the tributaries of the Buffalo River from the King William's Town Road Bridge to its source, Zwartkops River, Izeli, Keiskama, Kabusi and Wildebeeste or Inxu Rivers, the Inhlahlani and the Gqogqora streams, together with the headwaters of the Umtata River, in the Tsolo District, and in the tributaries thereof, and the Ḡqingqiskodo River (excluding its tributaries) in the Umzimkulu District, between the 1st day of October in any year and the 31st day of March in the following year, both days inclusive; provided the following conditions be observed, viz.: —

(*a*) That no person shall fish for trout of any variety without having first registered his name with, and obtained a permit from the Resident Magistrate of any of the following Districts, viz.: — Cape Town, Paarl, Stellenbosch, Caledon, Ceres, Wellington, Tulbagh, Piquetberg, Worcester, Port Elizabeth, East London, King William's Town, Grahamstown, Maclear, Tsolo and Umzimkulu.

(*b*) That the means employed for capturing and killing trout shall be rod and line only, and that artificial non-spinning fly only be used as a lure, except in the Princess Vlei where spinning lures can be used, provided that such lures shall be mounted with not more than three single hooks instead of the usual flights of double or triangle hooks; and no nets or other mode of capture shall be allowed, but this shall not be held to exclude the use of a legitimate landing net or gaff for landing the fish caught.

(*c*) That if any trout less than 12 inches in length be caught, it shall be forthwith returned to the water from which it was taken with as little delay and as little injury as possible, and that the number of trout of 12 inches in length and over which may be caught by any one person in one day shall not exceed six.

(*d*) That the consent of the owner on whose ground it is proposed to fish be first obtained. (In the case of waters situate within Forest Reserves a licence to fish must be obtained from the Forest Department in addition to the permit above alluded to.)

(*e*) That the permit issued be produced for inspection when demanded by any member of the Police Force, Forest Officer, or other Government official or by the owner of the property on which the holder of the permit is fishing.

(*f*) That the permit be not transferable.

2. Riparian owners shall not require to obtain a permit to fish for trout in the open waters on their own property during the fishing season, but such fishing shall be subject to the conditions mentioned in Regulation No. 1 of this Schedule.

3. Any person or persons contravening any of the foregoing Regulations or any of the conditions thereof, shall be liable on conviction, to a fine not exceeding twenty pounds sterling (£20) for each offence, and in default of payment thereof to imprisonment with or without hard labour for a period not exceeding three months.

Removal of Sheep and Goats to the Transvaal.

Attention is drawn to the Regulations which govern the removal of sheep and goats from this Colony to the Transvaal, as these do not appear to be as well known as they should be. Sheep and goats intended to be introduced into the Transvaal are liable to examination at the Port of Entry on the Border, and if found to be infected on arrival on the Border, to be sent back to the place from which they came, or to be detained at the Port of Entry pending enquiries, which in either case will mean heavy loss to the owners. Small stock *en route* for the Transvaal must be accompanied as far as the Border by the owner's pass, form "C," as required in the case of clean sheep removed within the limits of the Cape Colony, but such pass is only available as far as the Border, and no one within this Colony has the power to grant permits for the removal oi small stock *into* the Transvaal. Careful observance of these Regulations will save owners of small stock much inconvenience and loss, such as is bound otherwise to occur.

Citrus Fruit in England.

The following report, dated 16th October, has been received from the Trades Commissioner, London, on the shipment of fruit per R.M.S. "Walmer Castle," which sailed from Cape Town on 9th September last, and is published by the Department of Agriculture for general information:—

(*a*) Oranges.—The fruit generally was of a good quality; but the boxes were far too loosely packed and caused considerable loss, as will be seen from returns. All the fruit had to be re-packed, which caused a loss of 18 boxes. The sound fruit thus re-packed made from 9s. to 12s., and the whole lot made an average price of 6s. 4d. per box.

(*b*) Oranges.—These were fairly sound and of a rather good quality. They were, however, far too loosely packed, and the battens of the boxes were too wide apart, which invited pilfering. They were all re-packed, which caused the loss of a few boxes. The lot, however, realised an average price of 6s. 2d. per box.

(*c*) Oranges and Naartjes.—The oranges arrived in a fairly good condition. The fruit was, however, still too loosely packed; but the quality was good, and they therefore made the very fair average price of 8s. 2d. per box. The dealers complain that the battens of the boxes were too wide apart, which invited pilfering. The naartjes which were dealt with on Covent Garden, were too small to satisfy the market; besides which, naartjes on the whole made very bad prices during the last few weeks. There were some wasty fruits in the boxes, all of which had to be re-packed, which caused the loss of one case. It is not advisable to ship naartjes unless they are large and of good quality, and packed in shallow trays.

(*d*) Oranges.—These arrived in a fairly good condition, and were sold direct from Southampton. The fruit was, however, too loosely packed; but the quality was good and they, therefore, made the fair average price of 8s. 9d. per box. The dealers complain that the battens of the boxes were too wide apart, which invited pilfering.

(*e*) Oranges.—These arrived in a fairly good condition, although there were a good many wasty. They had to be re-packed, which, of course, caused a loss in the number of boxes; they were all sold direct from Southampton and made the average price of 6s. 10d. per box. The dealers complain that the battens of the boxes were too wide apart.

(*f*) Naartjes.—This fruit, which was sold direct from Southampton, was too small to satisfy the market. There was some wasty fruit in the boxes, all of which had to be repacked, which caused the loss of cases.

A Portable Motor Boring Plant.

A South Australian firm of engineers, Messrs. J. L. Scott and Son, of Mannum, have adapted the motor engine to a portable drilling plant. This plant (says an exchange) is just now doing remarkable boring work in the Mannum district. It is driven by a 5-h.p. motor, giving 45 strokes per minute to the tool and 3 ft. 3 in. stroke, working a 7-cwt. drilling tool at a maximum fuel cost of 4½d. per hour, or 3s. per day of eight hours. The folding tubular derrick measures 29 ft. to top. Length of steel drill coil and slush pump coil are each about 520 ft., and have a thickness of ¾ in. and ⅜ in. respectively. The steel girder frame for the carriage measures 8 in. by 4 in.; length of body, 15 ft. 2 in.; width, 4 ft. 1 in.; hind wheels of carriage are 4 ft. 6 in. diameter and 7 in. wide; while the front wheels measure 3 ft. 6 in. diameter. The turn table is of pressed steel, and the only woodwork in the whole plant is in the tool-boxes, while the circulating tank at back of carriage serves as the receptacle for the boring tools when the plant is on the track. The crank wheel is 3 ft. 6 in. diameter, and the fast and loose flywheel 2 ft. 6 in. There are only four spur wheels on the machine, and the plant has the reputation of working with a success that has in every sense more than justified the expectation of the manufacturers and the investment of the purchaser, who is doing remarkably successful contract boring work with his plant in the district of Mannum. Illustrations show the whole outfit to be of a very handy and easily portable nature.

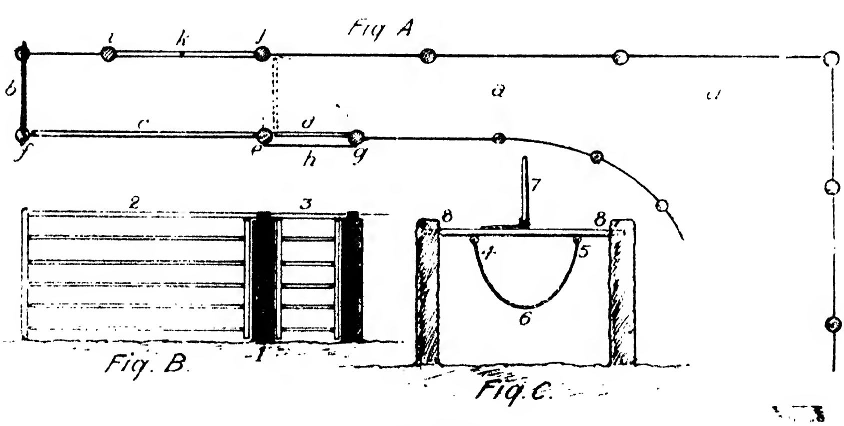
Export of Fruit—Season 1908-9.

It is notified for general information that, with reference to paragraph VIII., page 5, of the Bulletin issued by the Department of Agriculture, dealing with the Export of Fruit during the forthcoming season, the date up to which Agreements with Shippers may be forwarded to the Department has been extended to the 30th November, 1908.

FARM AND VELD.

Cattle Bails.

"Maori-Pakeha," writing from Thaba 'Nchu, says:—When visiting a neighbour the other day I came across an old number (September, 1907) of your valuable journal. In its pages I noticed an illustration of a yard crush and cattle bail, taken from an Australian paper. It is a useful construction and caused my memory to fly back to the '80's, and recollect that during that time I had invented an even more useful crush. My father was in the habit of speying several hundred heifers each year, and finding the work of catching each beast very irksome, offered me a reward of £20 if I could invent a useful crush. At the time I was studying architecture, and being keen on my studies evolved from my fertile brain the following useful crush:—



Cattle Bail.

Fig. A represents the race. *B* is the bail. *CD* is a swinging suspended gate, *C* being a long gate reaching from post *E* to post *F*, and *D* is a short swinging gate, the width of the race, reaching from *E* to *G*. *H* are stationary rails nailed on the outside of the posts *E* and *G*. The posts *I* and *J* are about a foot taller than the rest of the posts, and have slotted into them a stout round bar, say six inches in diameter. The plan of forming and erecting the swinging gates *C* and *D* is as illustrated in sketch Fig. B. 1 is the post *E*, 2 is a long, strong bar bored to fix and work on 3 and carrying gates *C* and *D*, so that when a beast is run up the race and fixed into the bail the gate *C* is swung open and *D* closes up the race, preventing any cattle coming up the race, and leaves an open unobstructed space to work with the knife.

Then on the rail K, as in sketch Fig. C, there are fixed at 4 and 5 strong hooks or rings holding a strong two-inch rope 6, that when passed under the beast's belly and brought up and fixed over the handle 7 is pulling tight on the animal. The handle 7 is a stout wiry piece of wood about four feet long, slotted firmly into the bar 8 at a little above the level of the hooks. A strong man then seizes hold of the handle 7 and with very little exertion pulls it back, the strain lifting the animal a few inches off her feet, and the operation of speying can then be carried through with no hindrance from a fence or rail in the way or kicking from the animal. So successfully did the plans work that my parents' neighbours were constantly requesting permission to use the yard and crush. I have forgotten to mention that all this took place in New Zealand long before the great boom in dairying prevailing at the present day. Now, I do not expect that speying is practised in any part of the Colony.

The Ked or Sheep Louse.

The Ked (*Melophagus ovinus*) commonly known to farmers in this Colony as the sheep louse (writes Mr. Alan G. Davison, Chief Inspector of Sheep), has during recent years spread to many parts of the country, and proved most troublesome among flocks of Merino sheep, grazed in the high grass-veld districts. In the division of Barkly East, the pest has developed in a remarkable manner, and but few flocks appear to be wholly free from its depredations.

To a casual observer, some of the sheep examined during a recent visit made to the districts of Barkly East and Maclear, would appear to be badly infected with scab, so torn and ragged were the fleeces. The keds which infested these flocks were present in considerable numbers, and evidently caused intense irritation, as evidenced by the manner in which many of the sheep had scratched and torn out their fleeces, until the animals presented a tattered and unsightly appearance. As many questions are continually asked by farmers regarding the treatment necessary to destroy the keds, a few facts respecting the life history of the parasite, as well as some hints relative to the most effectual treatment for the destruction of the parasite, may possibly be of use to those who are anxious for information on the subject.

Life History.—Unlike most insects, the female Ked does not lay eggs, but produces maggots, so far advanced in development that they immediately turn to puparia, after being deposited in the wool. These puparia are somewhat like apple-pips in appearance, and are easily seen at the base of the wool fibre of infected sheep. Reproduction is slow, a female lays but one puparium at a time, and only five, or possibly eight during her life time. There does not appear to be any definite time fixed for the hatching of the puparia, but, generally speaking, from three to twenty days after the puparia is deposited in the wool, the adult parasite is hatched out. The breeding season seems to be confined to the spring and summer months. The Ked, which is a wingless fly, lives entirely on the sheep. It has six legs covered with hairs and each terminated by a hook. On each side are seven stigmata or breathing orifices. The parasite is provided with a proboscis, tubular and toothed at the end, with which it scratches or pricks the skin of the sheep, and lives on the blood

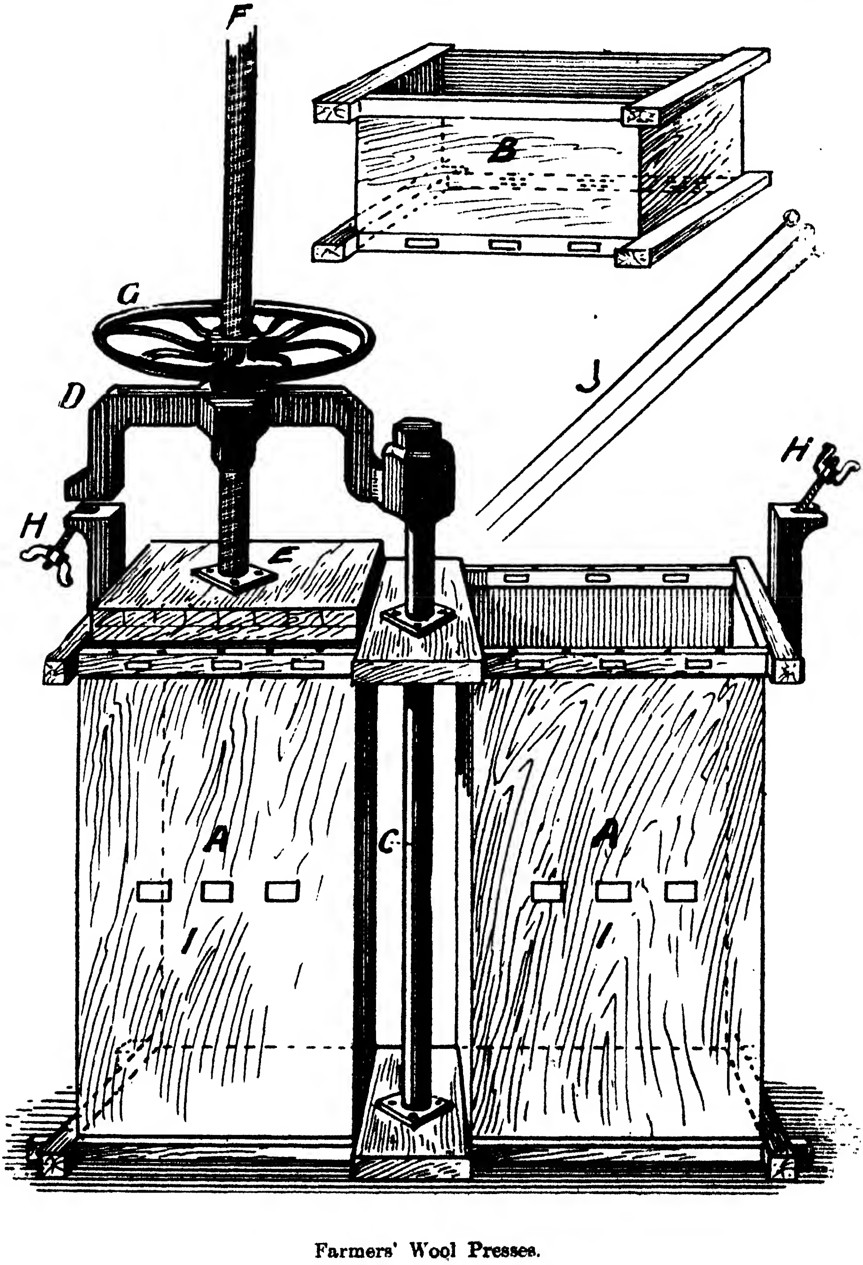
which exudes from the punctured spot, as well as on the débris of the skin. They will draw blood from a man, secreting at the same time a venom which causes swelling and irritation. The Ked may, however, also obtain nourishment from the natural grease or yolk of the fleece which it inhabits. They are found especially on long woolled sheep, and after shearing they leave the shorn for the unshorn or the lambs, where they secure better cover. The life time of the female is said by competent authorities to be from three to four months, although it is not denied that it may survive for a period of twelve months. After the female has produced one batch of progeny (say from five to eight puparia) she dies.

To Destroy the Ked.—During 1904 experiments were conducted in Great Britain, with the object of determining which of the sheep dips commonly used by farmers would prove the most effective in destroying the Keds. Some sixteen preparations were tested, but the purpose in view will be served by dealing with a few of the dips well known to farmers in this Colony. A sulphur and lime dip, prepared in accordance with the directions recommended by the Government of New Zealand, for the eradication of scab, which consisted of 25 lbs. of sulphur and 12½ lbs. of lime to 100 gallons of water, had very little effect on the keds. A fluid carbolic dip, which dissoleved very readily when poured into cold water, was found to be very effective in destroying keds, but some of the puparia left behind in the bath, or on the sheep, were afterwards hatched out. Tobacco and sulphur yielded good results. The dip was made by steeping 35 lbs. of finely ground tobacco for four days, straining off the liquid and adding 10 lbs. of flowers of sulphur, the whole being well stirred to secure an even admixture and the total bulk made up to 100 gallons. The mixture was heated to 110° F., and each sheep immersed for one minute. The animals treated revealed no living keds upon an examination being made subsequent to the dipping, but the puparia were evidently unharmed. Another dip, consisting of tobacco and sulphur mixed with soft soap, destroyed the keds, but some of the puparia afterwards hatched out on the sheep. Any of the sheep dips which are used, arsenical, tobacco or carbolic, will probably prove effective. In connection with the tobacco and sulphur dip already mentioned, I might explain that 36 lbs. of ground tobacco with 10 lbs. of sulphur to 100 gallons of water would probably be equal to one tin of Tobacco Extract mixed with 120 gallons of water, plus the 10 lbs. of sulphur

As none of the preparations I have mentioned will destroy the puparia, a second dipping is necessitated, and the question naturally arises, what period should be allowed to intervene between the two dippings. Mr. Law, F.R.C.V.S., in his Text Book on Veterinary Medicine, recommends an interval of one or two weeks between the first and second dipping, but, as this writer adds, the puparia hatch out in the course of four weeks, it might be desirable to postpone the second dipping for a longer period. Other evidence shows that the puparia may not hatch out until twenty-one days after being deposited in the wool, and there being no proof that keds can produce puparia within three weeks after they are hatched, the second dipping might be performed about eighteen or twenty days after the first operation. Whichever course may be adopted, both sheep and lambs should be dipped, and the flock placed on clean pasture for a few weeks to obviate the danger of keds being picked up which may have fallen from the sheep.

Farmers' Wool Presses.

Mr. C. A. Sheard, of Bitterne, Toise River, forwards the sketch published herewith of a wool press he has designed and had made. It consists of a double wool box built of deal, 1½ x 9 inches, and cross pieces of



Farmers' Wool Presses.

the same wood 3 x 4½ and two pieces 3 x 9 inches between the boxes. The iron apparatus on the top of the box is composed of a wrought iron bearing arm which is attached at one end of the shaft, and is made so

that the other end when bolted and screwed fast by the thumb screw rests firmly on an iron perpendicular plate on the opposite side of the box. The shaft is firmly fixed in a perpendicular position in a central position between the boxes. The bearing arm is fastened to the shaft on the swivel system to enable the apparatus to swing round and operate on the second box. The bearing arm has a hole drilled through its centre through which the perpendicular steel screw and cast iron wheel with screw bush operates, and at the end of the screw is fixed the pressure board of wood three inches thick. The press is worked by turning the wheel with the hand, which causes the screw with the pressure board to work downwards, but does not revolve, and in coming in contact with the wool presses it. Two fills with a shifting box on the top of wood box is sufficient to fill a bale. The press is strongly built, and an ordinary boy can turn the wheel and cannot break it.

Mr. Sheard successfully pressed his twelve months' clip of wool last December with this press. His agent, when offering the wool in East London, had some bales stood up on end and opened the whole of the top flap, so that buyers could see exactly how the fleeces had been rolled and packed. The opinion expressed by the buyers was that they had never seen South African wools so well packed, and Mr Sheard was congratulated on the manner in which he had done it. Mr. Sheard packed in 54 skirted fleeces in each bale, and after the pressure was taken off the wool was undisturbed, and as bright as before pressure was put on.

The Destruction of Rats.

Many correspondents lately have raised the question of rat destruction. This pest is growing to serious dimensions in some parts of the Colony, large extents of the veld being eaten out and ruined by these creatures. The damage done is something considerable, and the devastated zone is extending. As so many of our readers are interested, it would be worth their while to test a new preparation which is now on the market known as "Ratin." This preparation is a culture from a bacillus which is said to be deadly to rats and harmless to any other living thing. It spreads a disease among the rats which gives, according to German Government reports, a case mortality of 100 per cent., and is, according to the India plague authorities, absolutely indifferent to any changes of temperature. The microbe is known in textbooks on bacteriology as Neumann's bacillus, and was discovered accidentally in the urine of a child. By a process which can only be described as "breeding," however strange that may sound, Neumann succeeded in producing a microbe with an enormous rat-killing power. His work was continued by Dr. Bahr, of Copenhagen, whose variety of Neumann's bacillus is the preparation under notice known as "Ratin." "Ratin" is obtainable of the Ratin Bacteriological Laboratory, 17, Gracechurch-street, London, England.

"Ratin" is not the only preparation of this description on the market, others having been introduced at various times. With the others there was the drawback that those rats which did not take the infection or recovered became immune, and the remedy threatened to be almost as bad as the evil; for in the course of time a new tribe of immune rats would arise and be unaffected by the culture. "Ratin," from the particulars to hand, seems to share this weakness as well, but it has the advantage of supplying a supplementary preparation which is stated to be effective

against immune rats. This is described as Ratin No. 2. We have no knowledge of these preparations beyond the above statements which are extracted from information supplied from the Ratin Laboratory, and cannot, therefore, vouch for all the virtues claimed. But considering the extent of the damage done in this country yearly by rats, it should be worth experimenting with. Whether the varieties of field rats we have in this country would prove as susceptible as those experimented with elsewhere is as yet an open question.

Wire Worm in Sheep.

Mr. B. J. Niland, of Mount Prospect, forwards a further communication on the above subject in which, referring to the salt and lime water recommended by Mr. A. C. McDonald in the September issue, he writes: "I may say that I have also tried the salt and lime water, and found it very effective, but *only* in a dry season when the sheep can be kept from water and in a way forced to take to the salt water in the troughs. Last year we had a very wet season, and I found that the sheep would not drink the salt and lime water in the troughs as readily as in a dry season, and I put it down to the fact that it was almost impossible to keep the sheep from water in the veld, and that they were being re-infected with wire-worm faster than the little salt and lime water they drank could cure them. I next tried dosing with brine-water, and in this case the cure was worse than the disease, for not only did I kill the worm but the sheep as well, so that idea had to be abandoned. I also found that dosing with the brine-water, weak enough for the sheep to stand it, did not kill the worm in one dose.

"I next tried Bert Bowker's Cure, and consider that it worked wonders with the sheep, for they commenced to improve immediately after being dosed, and rapidly got rid of that pale, bloodless appearance so easily noticed on sheep badly diseased with wire-worm. I made a point of carefully examining any sheep that were killed or had died, and was agreeably surprised with the result. I am of the opinion that Bert Bowker's Cure is the best remedy we have for wire-worm, because it is quite as effective as bluestone, if not more so, and not nearly as dangerous, and, being a powder, is much more easily administered, which is a big consideration. I may also add that I am in no way interested in the Cure or its sale, and I do not think that anyone who reads the papers could accuse the owner of trying to obtain a cheap advertisement."

Pseudo-Scorpion in Beehives—*Chelifer cancroides.*

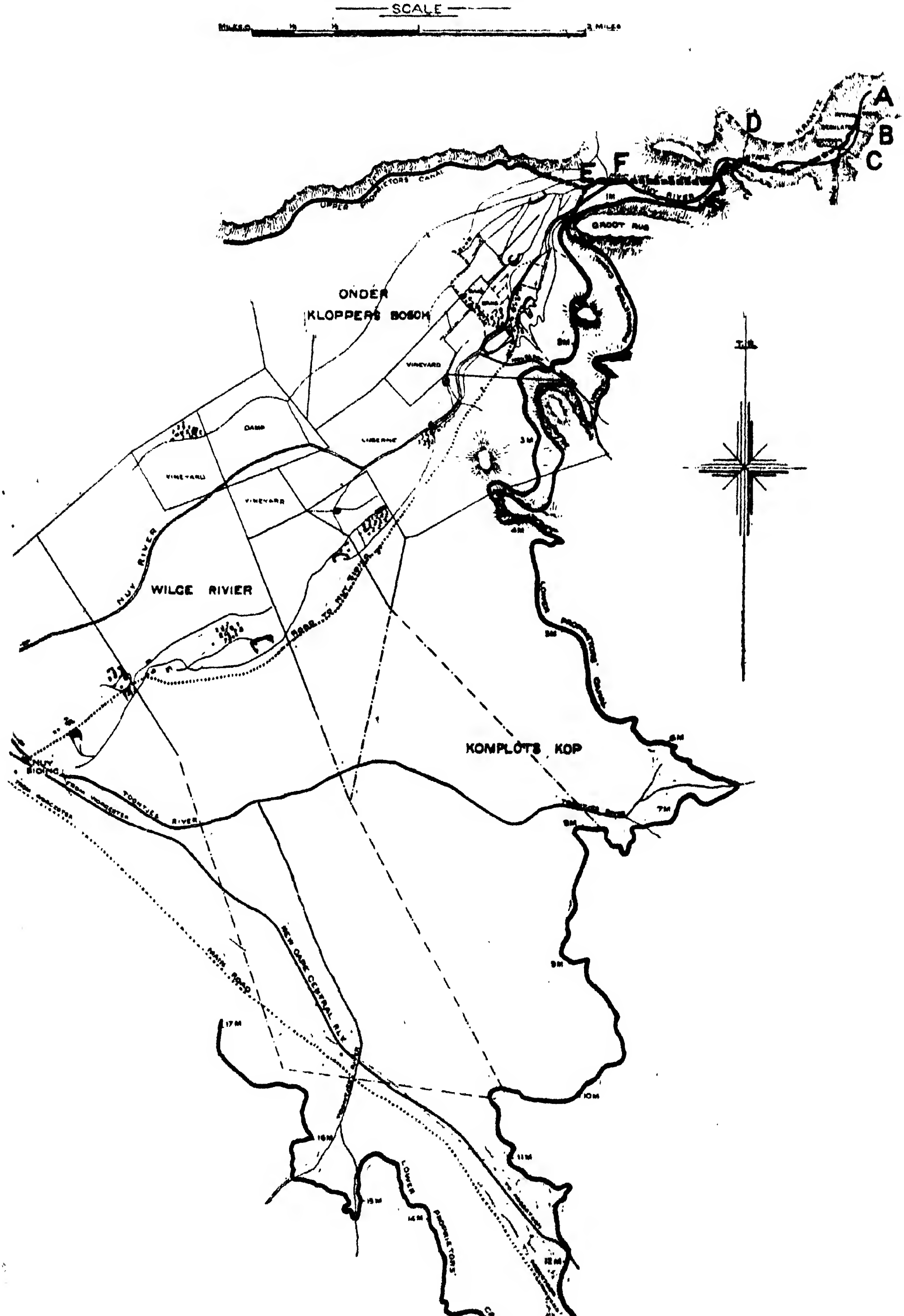
Mr. E. T. Wells, writing from Queenstown, forwards some particulars regarding the pseudo-scorpion in beehives, to which attention has been drawn in these pages. He found the insect some years back and sent specimens to the *British Bee Journal.* These were sent to Mr. R. I. Peacock, with a request for information, who supplied the following:—"The sketch you sent this morning represents what I believe to be an undescribed species of *chelifer.* The chelifers constitute an order of arachnida allied to spiders, scorpions, mites, etc. We have a few specimens of this species in the Museum, which came some years back from Natal. The trick of catching hold of the bee's legs is common to all the species of the group. Our English species, *C. cancroides*, for example, as well as other genera of the same group, may often be found hanging

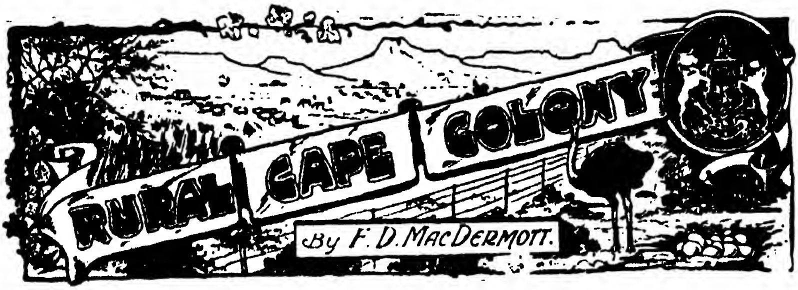
on to the legs of flies and *tipulæ;* others again in South America and elsewhere get under the elytra of large beetles. The reason for the habit is unknown, though perhaps it may be connected with the feeding habits of the chelifers, which devour mites and other small insect-like animals. I should say that they would inflict no damage upon the bees. They might conceivably destroy the eggs, but I do not think it likely. If they infest the hives, it is most likely in quest of parasitic mites and ticks." Another correspondent of the *British Bee Journal* later on described these pseudo-scorpions as being also found in old papers, being known in Germany as the "book scorpion." They are, he says, also found in fowl houses. They live upon mites and ticks, but, in addition to these, devour paper lice (*Psocus domesticus*, Latr.), so that they may be regarded as distinctly useful. Mr. Wells adds that he has found no damage arise from the presence of these insects in his hives, and they soon disappear from bar-frame hives. They seem to feed on the small mites, which now and again can be seen on the tops of frames, but in good hives this food supply is soon exhausted.

NUY RIVER IRRIGATION SCHEME

GENERAL PLAN

SCALE





NO. XXIX.

IN THE DISTRICT OF WORCESTER.

IRRIGATION IN THE NUY VALLEY.

The closing days of September saw the formal opening by the Prime Minister of the Colony of one of the most promising small Irrigation Schemes which this Colony can show at the present time. The District of Worcester and all the sections of country watered by the Breede River and its many tributaries have long been looked to as holding out prospects almost unrivalled for the carrying out of irrigation schemes on varying scales. The flow of water in the streams and the general fertility of most of the soils, combined with the favourable climatic conditions, all contribute towards a generally accepted conclusion that no more favourable sites are to be found in South Africa for the prosecution of such enterprises. In addition it has also to be remembered that the type of farmer which has been settled hereabouts for generations is an asset which can be counted with, for most of them are more or less intimate with irrigation farming in some of its most successful phases.

The Nuy Irrigation Scheme of which a good deal has been heard from time to time originated from efforts—which go back at least two generations, if not more—that were directed towards obtaining control of the mountain streams which go to form the Nuy River and utilise their waters for the service of the valuable lands which lie in the valley of the same name. The head waters of the stream rise far back in the mountains, and form part of those that flow from the farm "Keerom," in the Montagu District, owned by a family named De Kock. The rights to the waters flowing into the Nuy Valley were secured many years ago by the forebears of those who have brought the present scheme to fruition. In those days it was not a difficult matter to apportion the flow, for there were very few farms in the valley, but with the increasing importance of the cultural industries which developed and the consequent subdivision of the farms, difficulties arose which led to disputes. The whole of the water was owned by two groups of farmers, comprising six upper and seven lower, each group being entitled to a half share. When the disputes arose the whole matter was referred to the Supreme Court, which, so far back as 1846, in the person of Judge Menzies, held a court on the

spot and gave a judgment which forbade the taking out of any water higher up than the spot marked F on the plan published herewith. At this spot a cement dam was built for the purpose of dividing the waters, and that construction still stands to mark the line of demarcation between the old and the new. The consequence was that previous to the inauguration of the present scheme all the irrigation waters were led out by furrows starting immediately below this "deel" dam. As can easily be seen by glancing at the plan the extent of ground which could be served from this point was, comparatively speaking, limited. All that could be brought under the furrows was long ago irrigated, but as there was still a goodly surplus of water and plenty of land which could be served, provided the intake could be moved higher up the stream, a body of the more progressive farmers took the present scheme in hand. It is needless here to trace the difficulties and troubles which they encountered in their efforts to convince all interested how much it was to the general benefit to sink their differences and by co-operation and mutual effort, as well as sacrifice, enhance the prosperity of the whole community. Suffice it to relate that even these difficulties were ultimately overcome and the new scheme set fairly going. It was only by such complete co-operation that it was possible to set aside the conditions imposed by the Menzies judgment and divert the waters at a higher level to command the lands which were available for irrigation.

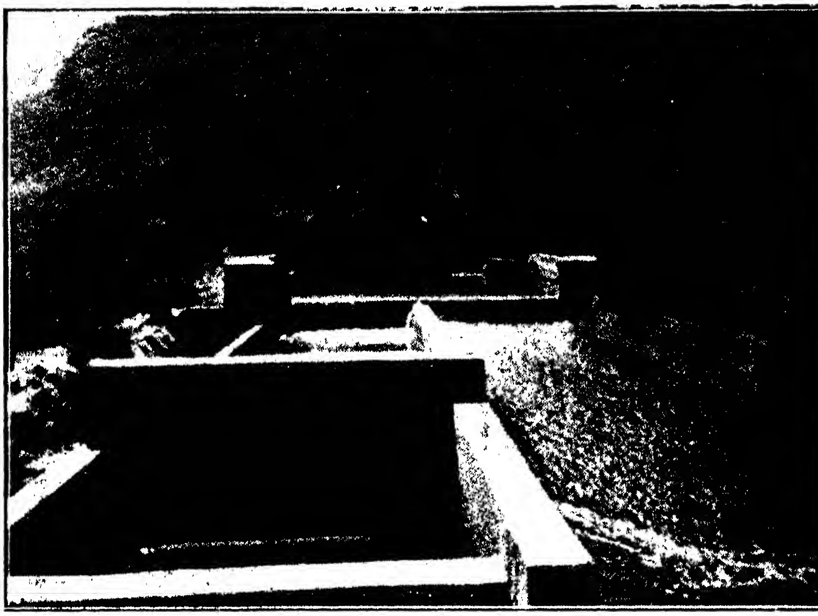
Description of the Works.

The works inaugurated on the 30th September were designed by the Irrigation Department of the Colony for the purpose of more fully utilising the water of the river and generally of improving the practice of irrigation in the valley. The Summer flow, *i.e.*, the perennial water of the river, falls as low as about 2 cubic feet per second, whilst in the winter the average flow is considerably in excess of this and at times reaches 100 cusecs. The chief crops grown in the valley are vines, lucerne and cereals. The vines usually require about one irrigation in the summer, the lucerne, of course, requires more; and one cusec will water about 200 acres. The cereals require water chiefly in the winter months and one cusec will then water about 400 acres.

The works as constructed consist of two portions, viz., a line of steel pipes 16 inches in diameter and about 13,000 feet long, capable of carrying a maximum of 8 cusecs, for the upper proprietors, and a furrow some 17 miles long, carrying as a maximum 30 cusecs, for the lower proprietors.

The plan shews the general distribution of the works. A concrete weir across the river at "A" diverts into a furrow 12 feet wide the whole flow of the river (up to the capacity of the furrow which is about 40 cusecs). At "B" a masonry head regulator, with two shutters, controls the furrow beyond and prevents excessive floods passing down, the surplus spilling above the regulator back to the river channel. About a quarter of a mile below the regulator is built the main division weir, "C," which divides the whole flow of the furrow into two equal parts, one for the upper and the other for the lower proprietors.

The steel pipes supplying the former commence at a small concrete pit immediately below the division weir, and forming a portion of the same construction. (See illustration.) These extend down the valley some 10,000 feet to the point "E," where the pipe line divides into two branches, one carrying water to the right and the other to the left side of the valley. The lower proprietors' share of the water passes from the division weir "C" back into the river channel down which it flows for about a mile to "D" where it is diverted into the furrow by a low weir. This furrow, which can carry about 30 cusecs, extends for some 17 miles



The Division Chamber. The right channel shows the lower proprietors' share. The left is the catch pit for the pipe line.

Intake for the lower proprietors' canal, showing pipe line crossing the canal on masonry piers.

At the bifurcation of the pipe line, showing the two large controlling valves.

The canal on the Krantz, showing some of the masonry work.

or so down the valley. In order to make the works quite complete, some device has still to be added for the division of any surplus water rejected by the head regulator together with drainage collected below the division weir.

The work has cost between £15,000 and £16,000. The original estimate prepared by the Director of Irrigation was £13,000, but in execution the actual cost exceeded this by some £3,000. £15,500 has been loaned for the purpose by the Government on the security of the rates.

The management has been in the hands of an Irrigation Board, consisting of the following seven members, with Mr. P. J. Theron as Secretary:—Messrs. Alwyn Petrus Burger, Thomas Arnoldus Hugo, Alwyn Petrus Kloppers, Dirk de Vos Rabie, Johannes Christian Rabie (S.son), Petrus Jacobus Rabie, and Philip Rudolph Rabie. A sub-committee of three was deputed by the Board to see to the details of the construction. These three gentlemen were virtually the constructors of the works, engaging their own labour and purchasing materials, and, with such professional aid and advice from the Irrigation Department as was necessary, they have succeeded in constructing a first-class work at a very reasonable cost.

As this was the first co-operative scheme which came under the Irrigation Department after its establishment in February, 1904, more attention was bestowed upon it, both in the early stages of its development and during the construction of the works, than would be found possible now when the awakened interest in irrigation, as the result of the appointment by the Government of expert advisers, strains to the utmost the limited resources of the Department. The extent to which this awakening in irrigation development has taken place will be readily understood when it is realised that, in addition to the more comprehensive projects and the larger State conducted surveys, such as the Ashton Canal Scheme, the Oliphants River, Fish River, and Hex River reconnaissances, the staff has during the four years of its departmental existence, dealt with something like three hundred applications for expert advice in connection with irrigation projects. True, not all of these have resulted in completed works, such as the one forming the subject of this article, but a large percentage of them have results to show, either in new works constructed or old ones improved. The most healthful sign of progress, however, is in the fact that the applications are month by month steadily increasing in number. Though these applications are generally from individual farmers, several are from co-operative groups, and many schemes which at present appear sufficiently small to be controlled by an individual landowner, give promise of extension, and will probably ultimately require the formation of Irrigation Boards similar to the Nuy. Mr. T. E. Scaife, Circle Engineer of the Irrigation Department, stationed at Robertson, and Mr. W. M. Watt, Assistant Engineer, rendered good service in connection with the Nuy scheme, for which they gained the thanks and appreciation of the Board.

That the work was not all quite simple could be readily seen by those visitors who on the opening day were sufficiently energetic to walk along the portion of the furrow excavated through the krantz, where there is evidence of much hard work having been done and much explosive and steel having been expended to win a way for the water through several miles of very hard ground.

The scheme makes no provision for storage on a large scale, but during the winter the flow will often be more than can be utilised immediately on the land, and the farmers who have a use for it may if they like, store the surplus in dams constructed on their own lands, many good sites for which exist. The total area of land now commanded by the works described is over 8,000 acres.

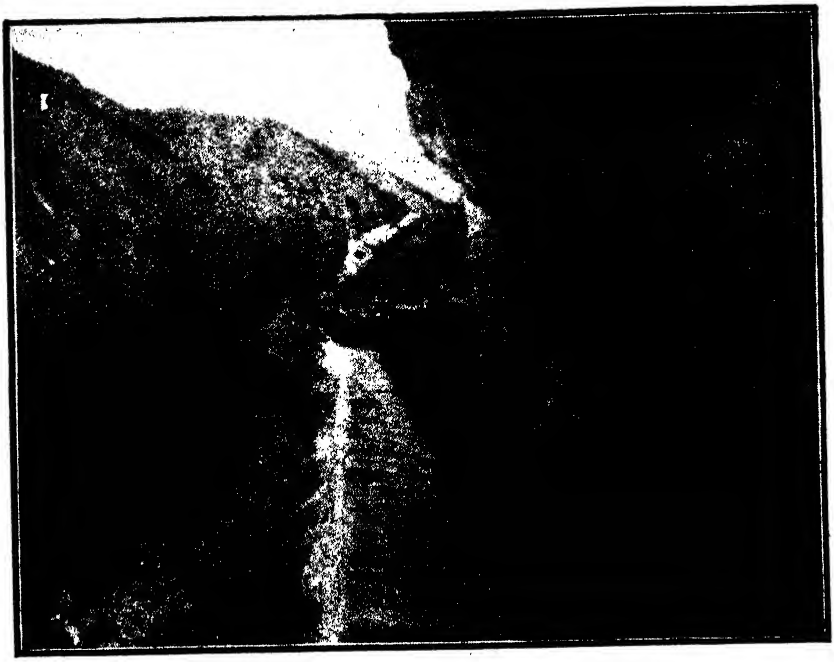
The Nuy valley is one of several side valleys opening into the Breede, which share with it many natural advantages difficult to beat by any district of so great extent in the Colony. First, there is the advantage of the perennial water in the Breede and many of its tributaries. The Breede, rising in the mountains surrounding Ceres, brings down a plenteous supply of water. Even throughout the summer the waters of the river never fail, and from the Ceres district, in the driest season, a perennial stream flows of immense value, whilst many of the tributary streams, notably the Hex, Smal Bladeren, and Holsloot, add to the flow lower down. True, in the dry season most of this water is used by the various canals leading off, so that very little may flow past the weir which diverts the water into the Breede River furrow above Robertson; but that so much water is already utilised is a matter for congratulation. In the winter the discharge of the river is very great, at times more than 20,000 cusecs flowing over the Robertson weir. The full utilisation of this flow of the river has for some time been engaging the attention of the Irrigation Department, and a scheme has been prepared—the Ashton Canal scheme—which could effect this purpose. If this great work is carried out we may reasonably hope to see within a very few years such agricultural development in the Breede Valley as will place it second to none in the country.

The second great natural advantage which the valley possesses is that the central portion—extending roughly from Worcester to Swellendam—possesses a Karoo soil and Karoo climate. When to these is added the abundance of water already referred to, and which is not by any means a usual attribute of Karoo country, it will be readily seen that it possesses natural gifts, which only await proper development to produce a rich and fertile district.

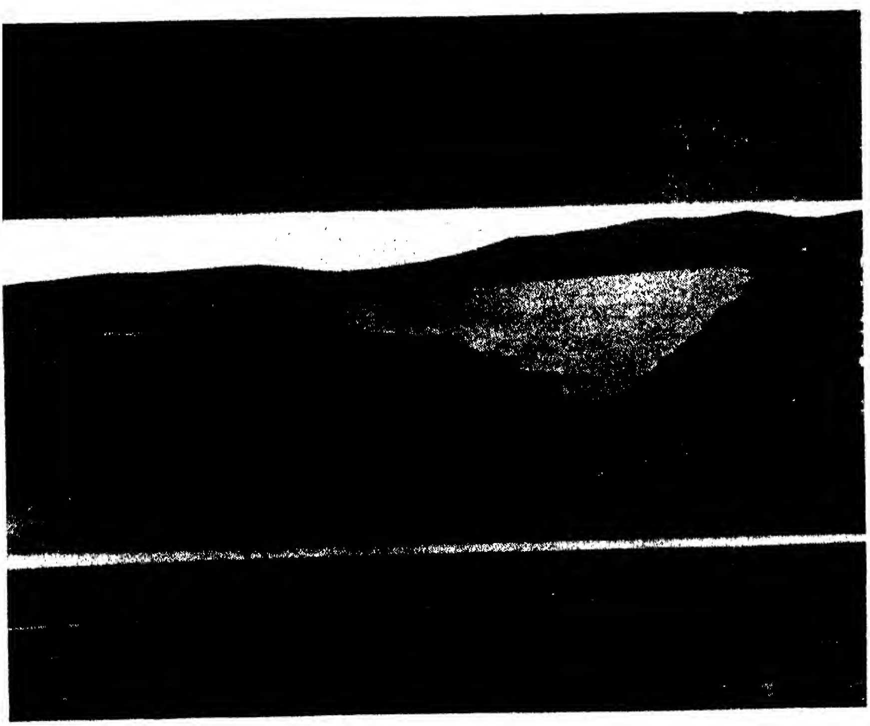
The above notes, with the illustrations and the plan published herewith, should give a very fair idea of the magnitude and substantiality of the works throughout. The necessity of the pipe line, it may be further explained, arose from the fact that the furrow could not be made to serve all the requirements of the upper proprietors, owing to the conformation of the ground. The illustrations show that the valley, for the greater part of the upper portion where the waters are diverted, is both narrow and steep. The canal had to be cut on one side of this valley in order to meet the requirements of the lower proprietors. But to meet all the necessities of the upper proprietors, the water had to be carried across the valley again, hence the pipe line, which really acts as a syphon on an enormous scale, and thus delivers the water for the upper proprietors at a much higher level than could possibly be served by gravitation from the main furrow. The scheme thus looks, at first glace, a little complicated, but once on the spot the whole thing is quite clear.

The Cultural Activities of the Valley.

The Irrigation Works were, naturally, the leading feature of interest to the large and influential gathering of visitors who assembled on the opening day to enjoy the hospitality of the promoters of the scheme, but as there are many other features of the valley which are of equal interest, I took advantage of the occasion to have a fairly comprehensive look around prior to that interesting ceremony. I then saw a good deal of both the farms, the farmers, and their farming methods. To say that it was an unmixed pleasure to find so much keen and energetic cultivation in so comparatively small a community is but a feeble expression of the impressions I received. On every hand one sees not only signs of well-directed activity, but the activity itself, for the people of the Nuy are a busy community.



The canal on the Kran'z, top view.



Pipe line on tressels crossing a river. A Dam in the making. Pipe line on masonry piers.

The formation of the section included in the irrigation scheme may be described as that of a fairly wide valley, narrowing from the comparatively flat country which stretches between the Breede River and the Hex

Outfall of pipe line at highest point.

The pressure a few feet lower.

River Mountains to the north, that seem to hedge in the whole of that section. This valley gradually narrows towards the mountains until it closes in to the dimensions of a defile. It is in this narrow section that the water is diverted. The river itself winds a rather devious course through the bottom lands, and it is in this portion where the existing cul-

Masonry Aqueduct carrying the canal over a spruit.

tivation extends. But the new canal will enable the farmers to carry their cultivation on to much higher levels, and thus bring in a very wide stretch of really good land, which promises to give as good results as that now under crops. To give some idea of what has been done in the past

I may mention that well within the memory of some members of the older families the lower portions of the valley were frequently flooded and almost swamps in the winter. All that has been changed by means of deep drainage, and now that the value of this method is established it is being followed up on a much larger scale.

The main crop in the past has been the vine, and a very large extent of the valley is still devoted to viticulture. Even in the present depressed condition of the industry many of the farmers are busily engaged in reconstituting on American stocks, for the dreaded phylloxera has made its appearance, and its ravages are apparent in many places. Of recent years, however, the disadvantages of relying too much on one crop have forced themselves on the attention of the people, and lucerne has been laid down on a fairly extensive scale. This has led, by degrees, to the introduction of the ostrich, so that the leading features of the present day may be said to be viticulture and ostriches. What developments may arise in the future depend, of course, on the progress of those two industries, but it may be considered fairly safe to anticipate that neither will be ever entirely abandoned here, as they both suit the conditions so well. Viticulture may have its set-backs, so far as the wine trade is concerned, but more than one of the more far-sighted are looking for other outlets for their grape crops in the future.

Cereals are grown to some extent, principally barley for feeding and malting purposes, the latter having been very successful. Fruit has not as yet assumed commercial proportions, though as time goes on it seems fairly certain that this industry will attract attention—in what particular form has yet to be decided.

Stock has not, so far, assumed anything like appreciable proportions either, but with the rapid extension of the lucerne lands, that branch of farming seems bound to be more seriously considered. In addition to ostriches, cattle, sheep, and horses are farmed, but not on a large scale. The cattle seem mostly of the Friesland type, and those I saw gave promise in the most useful directions. The sheep were all of the black-headed Persian variety, mostly kept for butcher purposes and local wants. Of the horses the types vary somewhat, but the general stamp had a very useful appearance, while some of the farmers' cart horses are really excellent animals.

One great advantage which the valley enjoys is its proximity to the railway. The station of Nuy on the New Cape Central line is within six to seven miles of the most remote homestead in the valley, while some of the homesteads are situated within a stone's throw of the line itself. In fact, the lower section of the main canal, as will be seen from the plan, actually crosses the line, and waters land situated south of the railway embankments.

The soils of the valley vary, but they may be described as consisting mainly of the Karroid type. In the lower portions of the valley the soil is very deep, being mostly silts deposited by the river in the course of its meanderings during the ages. The hillside lands are not so deep, and gradually get thinner as one reaches the higher levels, but they are all good, and should well repay the cost of clearing and bringing under irrigation.

The only possible point of criticism about the whole of the valley, its irrigation, and its farming, is the fact mentioned above, that no provision is made for the storage of the winter flow of water for use in the usually dry summer season. This may come later, when the farmers have had time to breathe after their present Herculean efforts, for any scheme to this end will involve a very heavy outlay. In the meanwhile, however, most of the irrigators are doing something in this direction. Up to now

there is plenty of land, and they are not crowded with small proprietors like the older irrigation settlements of the Colony. The result is that there is still plenty of space and to spare, even in the valley bottom, and advantage is taken of this fact to construct fairly large earthen dams, which serve for leading purposes and storage as well in case of necessity. As I had the pleasure of going over a few of the most typical farms of the valley I feel it may be of some interest if I append a few notes.

The Hugos' Farm "Glen Oak."

There are many picturesque and attractive spots in the valley, but few can rival the surroundings of "Glen Oak." It was here that the guests on the opening day were entertained to an *al fresco* lunch, and all were loud in praise of the beauty of the scene. The farm dates back to the early days of the Colony, and was a place of some consideration and importance even then. It was originally in the hands of the Rabies, a family which is very strongly represented in the valley to-day, and passed to the Hugos by marriage. It is at present farmed by two representatives of that family in the persons of Messrs. T. A. and D. M. Hugo. The old homestead, a view of which is shown herewith taken from the garden, was erected in 1810, and its substantial walls stand to-day as firm as ever, a monument to the thoroughness of its builders. It is an unpretentious structure, in the accepted style of the times, its one striking ornament being a well-executed design on the front gable showing the Rabie crest, with the date, "1810," underneath. A little below this is the more modern residence occupied by Mr. D. M. Hugo. This farm occupies the right-hand portion of the upper part of the valley, and is thus one of those described as the "upper proprietors." It stretches away right into the defile from whence the water is taken, and in this connection it may be worth while pointing out that, in addition to the points already mentioned at which the water from the pipe line is delivered, there are several spots in the valley where short leadings are carried to the hillside in order to allow of the lands being irrigated well up the defile. The object of this, as I understand from Mr. T. A. Hugo, is to be able to get lucerne established here later on. The ground is rather rough, but it should prove valuable for grazing purposes. In addition to the two substantial homesteads and roomy outbuildings there is also a large winery and distilling plant, which is capable of handling a very large crop. The fermenting tanks are constructed of cement sunk into the hillside and covered with earth. These are situated higher than the cellars, so that the wine can be gravitated there when necessary.

The cultivated lands are all laid out quite close to the homesteads, and consist mostly of vineyards and lucerne lands. All these come under the older irrigation works, which are still used, and usable in many places. The vines occupy most of the lower lands, while the lucerne is sown on the hillsides. To one used to the careful methods in vogue in places like Oudtshoorn and the irrigation sections of the Eastern Province the lucerne lands here appear rather roughly established. Instead of the "bed" system, as practised in other parts, the lucerne is laid down in large paddocks, not over-carefully graded. The result is a certain amount of irregularity, which makes for unsightliness, but as they are mainly used for grazing purposes, it is generally accepted that the system in vogue is fairly satisfactory. It may be taken, however, that this system must give way in time as the value of the land increases and the demand grows for greater returns. Meantime, however, there is so much to be done, with the increased water supply, that it is fairly certain that for some time to come the methods now favoured will hold good.

Mr. T. A. Hugo's Residence at "Glen Oak"—the old Homestead.

Mr. D. M. Hugo's Residence at "Glen Oak"—the new Homestead.

Previous to the inauguration of the present scheme the water was delivered on Glen Oak at a much lower level. Now the pipe line carries it some seventy feet higher, and thus brings under cultivation an enormous area which has hitherto been nothing but poor grazing veld. The outfall from the pipe is delivered into a furrow, and from there gravitates over the whole of the arable lands.

The main item on the stock side is the ostrich, and it is gratifying to learn that this section has been developed with such care that Messrs. Hugo have successfully competed with their feathers against the Eastern growers in their own market at Port Elizabeth. This is mainly due to

1. Young reconstituted Vineyard at "Glen Oak." 2. A view across he valley. 3. The Vineyard that won the Jagger Cup twice.

the care which has been exercised in the selection of the foundation stock, and there is every prospect that the future promises well for this particular flock of really good birds. In addition, I may state that Messrs. Hugo have been very successful exhibitors at the leading Agricultural Shows.

Some cattle and Persian sheep are run on the farm, but these are quite subsidiary to the industries mentioned above.

The famous oak glen, from which the farm takes its name, is situated close to the homestead, and alongside the river, and forms quite a small forest. It was under the shades of these grand old trees that the guests were entertained to luncheon on the opening day. There must have been

a tremendous growth of oak trees on this farm at one time, for on all sides they are to be seen, or the remnants of them, cut away to make room for crops, or pollarded as fences. In fact, at the present time the Messrs. Hugo are deeply engaged in the laborious task of removing many grand old trees to make space for further cultivation. The bottom lands in this valley are considered to be of too great value to devote any longer to the cultivation of oak trees. The utilitarianism of the age has evidently penetrated even to this remote corner.

Among the Rabies.

On the other side of the valley, not more than ten minutes' walk from "Glen Oak," one gets among the Rabie family, of whom there are many representatives here. These also are among the "upper proprietors." The farm highest up on this side, "Leipzig," is one which has until recently been worked by the well-known wine-growers, Messrs. Phillip and Peter Rabie. It has now been sub-divided, Mr. Peter Rabie taking one portion and Mr. Philip Rabie the other. It was originally about 1,700 morgen, and has some 800 morgen now under the irrigation scheme. The brand of P. & P. Rabie is a noted one among the leading viticulturists of the Colony. The illustrations herewith give some idea of the extent of the cultivated area on this farm, which is mainly devoted to the vine. Here one can get a better idea of some of the troubles and problems which have had to be faced in the times that are past, nearly all connected with the division and distribution of the water. Mr. Phillip Rabie was good enough to take me round and show me how this work had been handled prior to the present scheme. It was a simple matter so long as the water could be utilised under one management, as it were, but with sub-divisions came difficulties. These were overcome by means of large dams, constructed fairly low down, so that the waters could be led from the then existing furrows and held up for use as required. The pipe line, of course, delivers the water much higher, and brings more land under irrigation, but the dams will still be used for the lower deliveries.

As showing how precious and valuable water has been considered, Mr. Rabie took me for a clamber up the mountain side, where he showed me a really excellent piece of work carried out in his father's days, by which a small stream is led down through a stone-lined furrow to add its quota to the supplies drawn from the river. It comes rippling and dashing down a very steep course, and ultimately finds its way into the main furrow fed by the main pipe. In other places also in these rough mountain gullies he showed me where a good deal of time and labour had been expended in attempts to open up further supplies which were supposed to have been located, but these proved vain, and nothing is left now but the deep excavations that scar the hillsides.

Of the homestead and its surroundings it is impossible to say too much. The oaks and the beautiful gardens, with flowers and fruit in abundance, while below is stretched a magnificent vista of cultivated land in the valley, the whole flanked by the towering hills which enclose it on all sides, must appeal to the most exacting. And the interior of the homestead is just as charming as the exterior, for it is comfort and refinement combined. As the principal feature of the farm is viticulture, the wine cellars and fermenting houses, with a large distillery below, naturally came in for a good deal of attention. With this I give an illustration of the cellar, which speaks for itself, and I can only add that everything is on the most complete scale and quite up to date. Later on I had the pleasure of seeing the Jagger Cup, which has been won two years in succession by vintages from this farm, and I photographed the vineyard

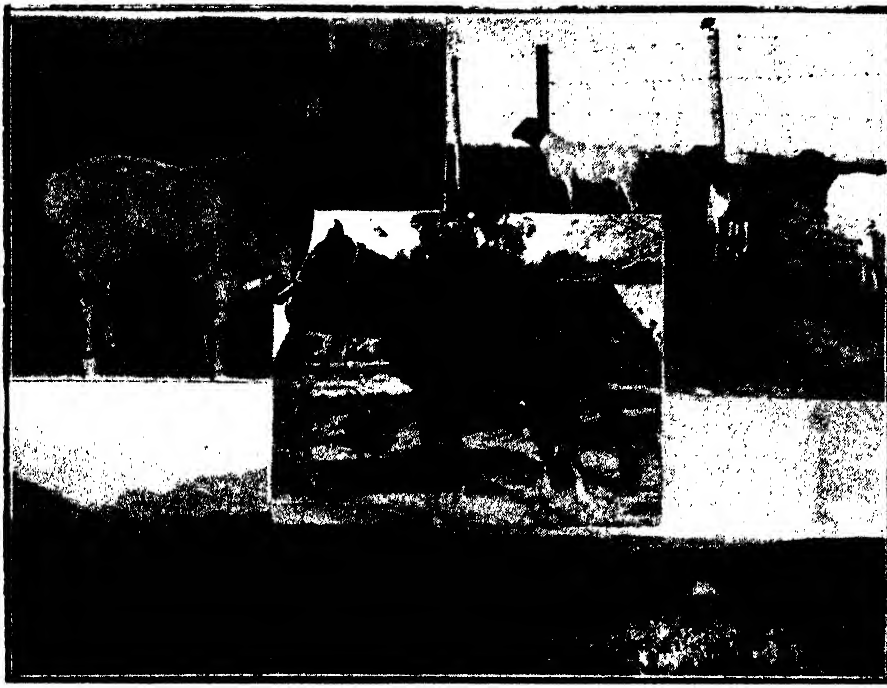
where the wine was grown. From the cellars and fermenting house to the vineyards a narrow-gauge tramway has been laid down, which is used for mule trolleys in the vintage, upon which the crops are loaded, and thus transported to be manipulated. So that very little is missing in the shape of up-to-date and complete economic methods.

"Brakvlei," the Home of Mr. Dirk de Vos Rabie, M.L.A.

A little lower down the valley, still on the left-hand side, is situated "Brakvlei," the home of Mr. Dirk de Vos Rabie, M.L.A. Here again the conditions are very similar to those mentioned above. All is substantial and redolent of prosperous comfort, and the staple product is the vine. It would surprise many of those who are not acquainted with the details of the wine industry to visit farms like these and see for themselves how great a part the vine has played in the Western Province in bringing about closer settlement, and encouraging production. It is safe to say that had it not been for viticulture there would have been very little cultivation of any kind in the Nuy Valley to-day. From here I was enabled to get a grand view across the valley, and the wide area of tilled lands, some laid down to vines and others to lucerne, with the flocks of ostriches grazing as contentedly as domestic poultry. And here I was again confronted with the important part played by dams in the irrigation works. Not only on those lands now under cultivation, but with an eye to the future, the work of dam-building is proceeding on a fairly large scale.

The arable lands on "Brakvlei" are nearly all on a low level, and as a result some trouble has been experienced in the past with the water. The one alternative was drainage, and this was tackled on a fairly extensive scale, with the result that some excellent work has been put in. It is mostly open drainage, however, or else the system known as the French drain. As these works have proved satisfactory for the time being, no attempt has been made to improve upon them, but again the question of land values must ultimately count as a factor, when improved methods should come into vogue. One of the minor troubles here is "brak," as the name of the farm implies, and this has been brought under control by drainage, although more will have yet to be done in this direction. The irrigation waters bring up a certain amount of "brak," but no serious trouble has ever been encountered. In point of fact, some of the best lands seem to be those which have been a little refractory in this direction in times past.

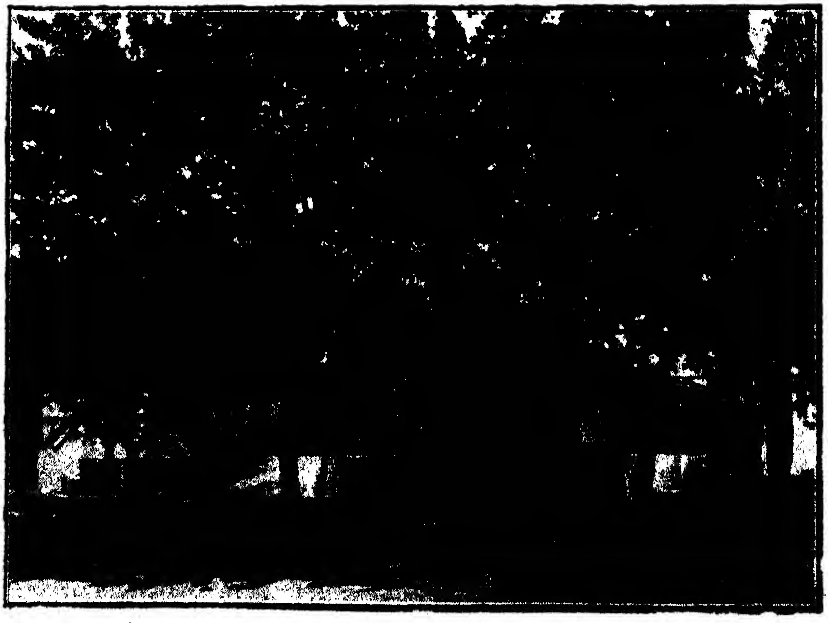
Otherwise all the farming conditions here are almost ideal, and as modern methods are being rapidly adopted by the younger generation the day cannot be far distant when some excellent model farming of a highly lucrative nature will be followed. All the conditions exist for almost any and every branch of agriculture, but it will take time to bring this home to the people. Should one thing fail or fall out of profit, there are plenty of others which could soon be substituted. The main crop, the vine, for instance, looks the most hopeless for the moment, owing to the depression in the wine market. Yet the people here are full of hope and confidence in the future. The older men shake their heads and remind themselves that they have seen things look just as threatening in times past, and they have struggled through. The younger men are busy re-constituting their vineyards, and are seeking other outlets for their crops. Among other things suggested is the establishing of a raisin industry on a large scale. How far this suggestion will be carried will depend upon how the grapes they grow can be adapted to drying for market purposes. In any case, I was assured, a serious attempt is to be made when the time is ripe to



Farm Stock in the Valley. The lower groups of horses are bred by Mr. A. D. Burger.

"Leipzic," the Homestead of Mr. Philip Rabie.

Interior of Wine Cellar at "Leipzic."



"Brakvlei," the Home of Mr. Dirk de Vos Rabie, M.L.A

expand this phase of viticulture if the depression in the wine trade continues. The variety of grape mostly cultivated here is the Hanepoot, and it is hoped to be able to convert it into a sound marketable raisin which may find markets abroad. A good deal depends upon the detail of seeding. If this can be mastered, and inquiries are now afoot as to the efficiency of various machines for this purpose now on the market, very little trouble is anticipated.

Before parting with Mr. Rabie, I was driven over to another section which has been brought under the new canal. Here the work of dam-building for water distribution has been taken up on a large scale. A huge earthen dam is being constructed into which the canal will flow, and thus provide a large supply for lucerne lands which are being laid out immediately below. This work is well forward, and should soon be complete. A narrow-gauge tramway has been laid down, and all the earth is being shifted in iron tip-trucks, similar to those used in mining. The introduction of this plant has simplified to a great extent the question of transport. The excavation is carried out in the usual way. When the bank is completed it is to be faced with stone, in order to add to its

View across the Valley from the Hill behind Mr. Dirk Rabie's Homestead.

solidarity. This work promises to be of great value later on, and should set a good example to others. It is much larger than the photo herewith indicates, for it is a difficult matter to get any idea on a small camera of an extensive construction of this description.

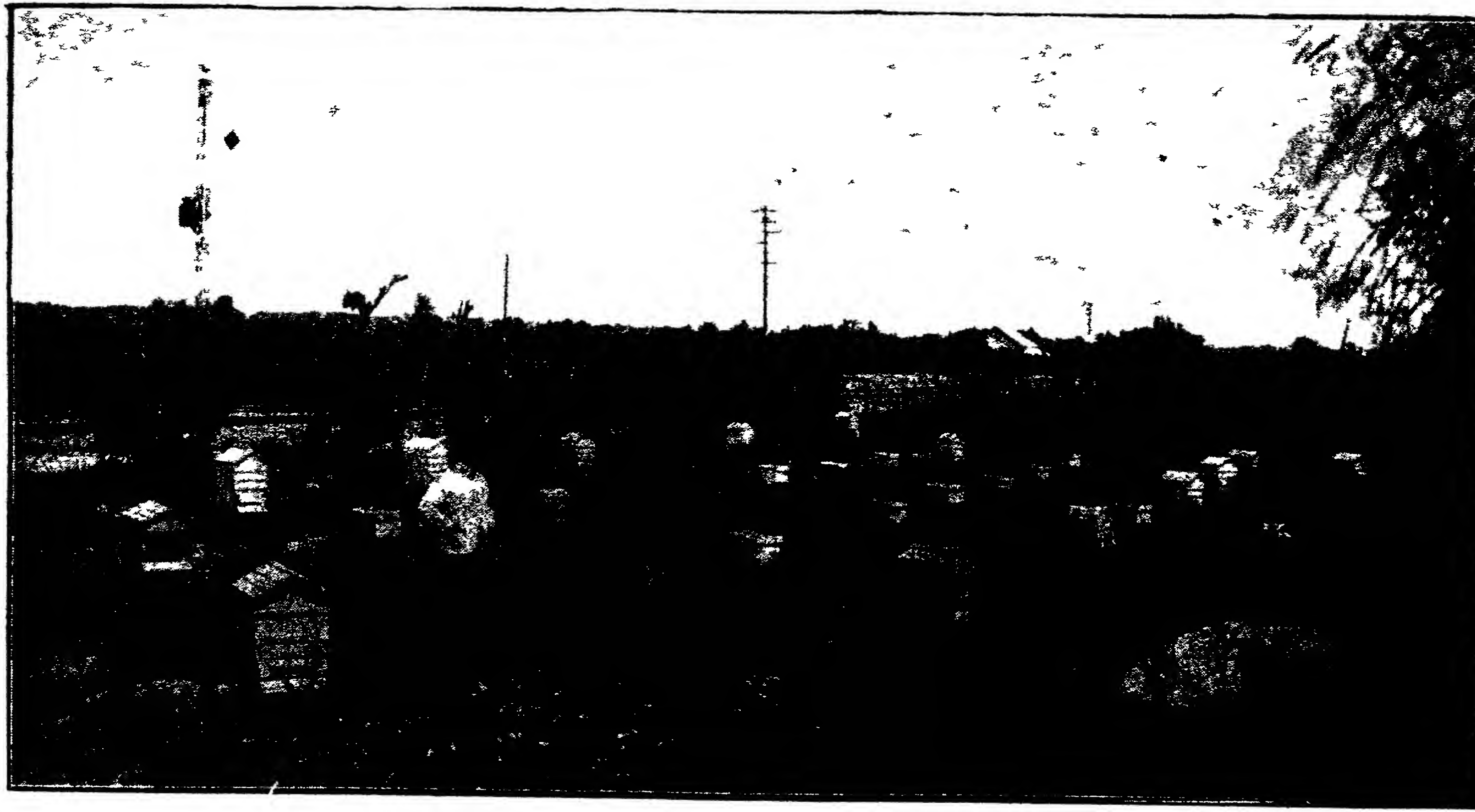
The Man who is not Afraid of "Brak."

As I have had occasion to remark before, there is so much similarity in the farming methods followed here that when one has described one farm there is very little left to say about the others. But there is a notable exception to this rule in the property owned and worked by Mr. A. P. Burger. His farm lies quite close to the railway, and is thus situated almost at the lowest level under the scheme. He has a wide extent laid down to lucerne and cereals as well as vines. In his position it can readily be realised that if there is "brak" in the neighbourhood he must have his full share, and this proves to be the case when one moves about a little. But he belongs to that very scarce type in South Africa, a farmer for whom "brak" has few, if any, terrors. An active, energetic

man, who has had to make his way against serious difficulties, he has tackled the "brak" problem in earnest, and claims to have mastered it. Judging from the appearance of his lands and the activity of his operations, his claim may be fully conceded. A portion of the arable lands now under crops has, apparently, suffered a good deal from this trouble, and he admits that at one time it gave him serious thought. He faced the difficulty, however, first by constructing open drains, then by closing them in and converting them into French drains, and finding that he gradually began to get the upper hand by these methods, he has now embarked on tile drainage on what promises to be a large scale. He has at present about a mile of drains in his lands, and as they are all proving satisfactory, he is extending them as fast as his means will allow, with the hopeful prospect of reclaiming all the "brak" spots on the farm.

Mr. Burger seems to devote more of his energies to stock than most of the farmers hereabout, although that branch is still but a minor detail compared to the others. He showed me some horses of a very good type which he is breeding, some very good cattle, and Persian sheep, of which he runs some fair-sized flocks. Of their class they are all good, and will, no doubt, go to form a more important section later on when the new irrigation scheme has had time to justify itself.

In conclusion, it may be repeated that very few spots of its size hold out better prospects than the Nuy Valley, for, come what may, the farming industries here are all soundly based, and the foundation of them all is the excellent irrigation scheme now in full swing. From reports to hand, I learn that after the opening some heavy rains fell in the mountains, and the canal was running so full that it would have been possible to float a fair-sized boat on it for the greater part of its seventeen mile course. Had the flow been anything approaching this on the opening day it would have been a glorious sight for the visitors, but all that was seen then was a normal set of conditions. Even these were sufficiently impressive to give everyone an excellent opinion of the soundness of the scheme.



Mr. H. L Attridge's Apiary, at Stikland, near Bellville

PEARS AND PEAR BLIGHT.

AN OPPORTUNITY FOR CAPE COLONY.

By CHAS. P. LOUNSBURY, Government Entomologist.

The discouraging condition of the pear culture industry in California through the devastating disease known as Pear Blight should lead Colonial fruit growers, particularly those dependent on the now languishing wine and brandy industry of the Western Province, to consider carefully if this misfortune of California may not be turned to the advantage of this country. To the writer, an excellent opportunity appears open to Colonial fruit growers in this respect, and he contributes these notes in the hope of arousing some public interest in the matter and of getting practical fruit growers to express their views.

Pear Blight is a bacterial disease due to a germ called *Bacillus amylovorus*. The pear suffers most seriously from its attack, but the apple, quince, loquat and some other related plants are also invaded and sometimes are considerably injured, particularly the apple. The name "Fire Blight," by which the disease is often called, is descriptive of the effect on the tree. The infection may enter through a break in the bark, or through the tip of a succulent shoot, or perhaps even through tender bark in which no break is visible, but the main channel for entrance is through the blossom, to which it is carried by bees and other insects incidental to their visit for nectar. If at blossoming time, the conditions are favourable to the trouble, a tree may become inoculated in a short time at many scores of places. The infection multiplies prodigiously and spreads down the part attacked, killing the plant tissue as it proceeds. It may die out after spreading only a few inches, but if the bark is soft and sappy and other conditions favourable, it may continue downwards and end by killing the tree. Its progress is marked by the oozing of gummy matter, swarming with germs, from the newly-attacked bark. The germs perish quickly in direct sunlight, and when washed into the soil, and are short lived in the bark unless this remains moist.

The disease is known only in America, and in some eastern states it was recognised over a century ago. Its importance varies with general and local climatic conditions and with different varieties of its host plants. Quite naturally the commercial culture of the affected fruits in the older parts of the country has in the course of time become restricted to sections where the disease is least injurious; and specially susceptible varieties, as well as sites and exposures most favourable to it, are avoided. Therefore over a great area subject to it, the disease is now not much felt, and it chiefly attracts notice in newly developed parts of the country, into which after a longer or shorter interval it has followed the extension of

fruit culture. Moreover, experience has shown that it is much more to be dreaded in southern and western states than in the north-eastern states, where it has been longest known, on account of the relatively long growing season, and the mild winters of the former.

At one time there were great hopes of an immense pear industry in southern states, and the Le Conte, an oriental variety that was supposed to be nearly proof against the disease, was extensively planted. But even this hardy pear proved too susceptible in the southern climate. Great orchards were swept away by the disease soon after they came into bearing, and all the dreams of success in growing pears on a large scale were rudely shattered. The far western states entirely escaped the trouble until recent years, and the kinds of trees most attacked were extensively planted quite regardless of its existence. The highly-prized Bartlett (Williams' Bon Chretien) is one of the most susceptible kinds, so much so that it is little cultivated commercially in the older states, but in California, doubtless in part owing to the difficulty of growing it eastwards, it became the most favourite variety. Gradually California developed into the greatest pear growing country of the world, and the Bartlett gained in popularity until it became almost the only variety cultivated. But at last Pear Blight appeared.

The disease has now been in the State for about ten years, and during this time it has become established in all the important pear districts, except a few in the west central part below San Francisco. At first it seems to have attracted little attention, but five or six years ago it began to work terrible havoc in the leading pear districts of the great interior valleys. Its destructiveness in the East seems insignificant to its ravages in those parts of California. Whole orchards, some upwards of fifty acres in extent, were wiped out in a single season. The report of the State Board of Horticulture for 1901-1902 gives the number of bearing pear trees in Fresno County as 125,040. The following report, that for 1903-1904, gives the number as only 1,040. In his report for 1906, the Secretary of the Horticultural Commission of the County says:—"Pear culture in this county has become a thing of the past, owing to the ravages of Pear Blight, and we advocate the destruction of every blighted, and liable to be blighted, tree." The disease killed vast numbers of trees outright, but doubtless great numbers were cut out by owners who despaired of combating the trouble successfully.

Sound methods of dealing with Pear Blight had been developed in the East, before the disease spread to the far West, and officers of the State and National Governments have worked hard to prove the worth of these in California. The chief measure is to cut out all the diseased parts during the dormant season. If this is properly done, the infection is entirely eliminated. But while it is a simple matter to prune off all the diseased twigs and shoots, it is only skilled and conscientious workmen who can be depended upon to find all the infected spots on the main branches and trunk, obscured as many are by the roughness and thickness of the bark. And, moreover, the knives and other tools must be disinfected after every cut lest they leave active germs on the fresh surfaces that are exposed. The Government experts have shown conclusively that, despite its severity under Californian conditions, the disease can be controlled cheaply; but it is improbable that the average fruit grower can or will exercise the necessary care.

Pear Blight is not the only hard knock from which the pear industry in California is now suffering. Large numbers of the best orchards were on flat lands along the lower course of the Sacremento River. Injudicious gold mining operations, formerly carried on up the river, have resulted in raising the river bed, and rendering the low country liable to flooding. An

exceptionally high rise of the river occurred last year and, despite of the dikes for their protection, the orchards were terribly devastated. Between the Blight and last year's flood it is said that fully half the pear trees of California have been lost. The fruitful Santa Clara Valley has escaped these scourges, but there the blossom-destroying Pear Thrip has come into prominence during the past few years, and thus far no adequate means for coping with it has been discovered. And added to these various troubles the Californian pear grower has to contend against Codling Moth, San Jose Scale, and Fusicladium. For the last three years the Blight has not been as damaging as in the early years of the decade, chiefly owing to the seasons not having chanced to favour it so much; but years when it will rage as badly as ever are practically certain to recur, and its invasion of the districts that have so far escaped will probably happen in a few seasons. The mountains that protect them are pierced by railroads.

The State still maintains a substantial output of pears, thanks in large part perhaps to the new orchards that have come into bearing since the disease appeared. The heavy loss in trees might not be suspected from the figures on the output of canned pears as over 550,000 cases were put up last year against about 510,000 in 1899, but it appears that the canned output is being kept up at the expense of fresh fruit shipments and the production of dried fruit. Only 1,039 truck loads of fresh pears were sent away in 1907, against 1,513 in 1906, and about 2,400 in 1900; and the dried product has decreased from an average of about 4,000 tons for the four years 1897-1900 to about 700 tons for last year. In a recent article on the dried fruit trade the *California Fruit Grower* makes the remark: "Pears do not show much of a production nowadays, Pear Blight having cut down this industry to such an extent that it is only a side issue as far as the dried product is concerned."

No official statistics are at hand that show the number of pear trees in the State at the present time and before Pear Blight appeared; but such statistics would fail to show the extent of the calamity as when the disease came in, and for some years later, the orchards were being extended rapidly. Bearing trees, it will be understood, are much more liable to the disease than non-bearing ones on account of the infection entering chiefly through the blossoms and being carried by bees. The following figures, drawn from the only two recent reports of the Horticultural Commissioner that chance to be available for reference, at least give a clue to the extent of pear culture in the State, and show what a huge falling off has occurred in the planting of new orchards.

	1899-1900 Report	1903-1904 Report
Bearing Pear Trees	987,921	1,438,535
Non-bearing Pear Trees	532,035	260,215
Total	1,519,956	1,698,750

These figures were obtained in the first place from the Assessor's reports and were considered to be too low, by about twenty per cent., in the horticultural office. In the report of the 1905 California Fruit Growers' Conference, a prominent official stated that in the Sacremento Valley alone there were about 10,000 acres of pear orchards; and elsewhere, writing in 1904, the same party gives the average production of pears in the State as about 60,000 tons.

Pear trees in other Western States of America are suffering from Pear Blight about as badly as in California. The writer of an article on the disease for the 1903-1904 report of the California State Horticultural

Commissioner quotes thus from a report from the State of Washington:—"All through the inland region, Pear Blight has been a terrible scourge. A conservative estimate is that seventy per cent. of all the trees have been ruined by the Pear Blight within the last six years. Pear growers are generally discouraged by the outlook."

It is not the intention of the writer to convey an idea that the successful culture of pears is a thing of the past in California and other western states of America. He does not believe that at all. What he does believe is that henceforward the pear industry of that part of the world will always find Pear Blight a heavy burden, and that in consequence the fruit of the more susceptible varieties will have to command a much higher price than in the past in order to be remunerative. No variety that can be substituted for the Bartlett seems to be highly resistant. In a recent article the *Pacific Rural Press* quotes the *Denver Field and Farm* as stating that in degree of resistance the commonly grown varieties stand in this order: Seckel, Kieffer, Tyson, Garber, Angoulême, and Flemish Beauty. The Idaho, Clapp's Favourite, and Clairgeau are badly affected. The disease *can* be kept under control, even in the Bartlett, as has been stated, and no doubt it *will be* by some growers, and to these men pear culture may yield a much better profit that it has under the past happy conditions. But the price of success may include not only the painstaking cutting out of the Blight with disinfected tools, but also the substitution of a resistant stock for the very susceptible French seedling stock on which it has been customary to grow the pear tree, and perhaps the use of a resistant variety for the main stem and all principal branches as well, and also the use of a system of pruning which will keep fruit spurs where least damage to the tree will result should they become attacked. It seems probable that the majority of farmers will deem the trouble of these precautions too great, the more so as in Western America, unlike in the Cape Colony, farmers shift easily from one line of agriculture or horticulture to another. There is generally a choice of crops for which they can readily find a profitable market.

In the development of their great trade in deciduous fruits, the western states of America have not so much displaced fruit growing elsewhere as enlarged the avenues for the disposal of fruit. The consumption of dried or "cured," and more so of "canned" fruits, has been vastly extended. Indeed it may be truly said that the extension of the orchards in some classes of fruit has been due principally to the facilities which the canneries have offered for the disposal of the produce. The canneries pay good prices and their demands lack the uncertainty of the fresh fruit markets. The output of the Californian fruit canneries has doubled in the last fifteen years and is now about 3,000,000 cases annually. The Bartlett pear has proved one of the best, if not the best, of all fruits for canning; and nearly all of the annual Californian pack of about 500,000 cases of pears is of this one variety. In 1899 it made up just 99 per cent. of the output.

Californian canned fruits seem to have found a ready sale in England. The number of cases exported by sea to England, from San Francisco for a series of years is thus given by the *California Fruit Grower*:

1895	273,000	1899	611,000	1903	623,000
1896	270,000	1900	701,000	1904	661,000
1897	339,000	1901	131,000	1905	525,000
1898	462,000	1902	385,000	1906	272,000
				1907	161,286

The proportion of pears in these over-sea shipments is said to be about one-fifth, and the demand for pears is stated to be particularly good. The shipments are attended with a considerable chance of being jettisoned, and presumably with a consequent high rate of insurance, and the risk of deterioration is much greater than would be the case with shipments of similar produce from South Africa. The distance to England is about 14,000 miles and the voyage around Cape Horn is generally a rough one, often resulting in some loss of condition to the contents of the tins. The difficulties will be lessened when the Panama Canal is opened, but even then the distance will be about a thousand miles more than from Cape Town.

The official British Customs statistics do not differentiate between the different kinds of canned fruits, yet the following tables of the imports are instructive for the purposes of this article. Figures on the import of dried fruits and for fresh pears are also given. Those for the dried fruit show how dependent Great Britain has been on the American supply in this food line, and the decided falling off in imports of recent years, due no doubt to shortage in America. That Australia supplies the British market with a greater quantity of fresh pears than the Cape will surprise many of our fruit people.

Canned and Bottled Fruit in thin syrup: British Imports.

(Duty 1s. per cwt.)

From	1903.		1904.		1905.		1906.		1907.	
	cwt.	value.	cwt.	value.	cwt.	value.	cwt.	value.	cwt.	value.
		£		£		£		£		£
U.S.A. Atlantic ..	23,356	35,721	12,116	18,697	10,042	15,693	5,134	7,360	2,332	6,017
U.S.A. Pacific ..	159,653	232,759	253,391	368,696	258,376	395,803	169,744	263,529	20,982	37,959
Total from Foreign Countries.. ..	189,377	280,726	274,796	405,274	276,454	426,745	178,760	278,821	27,719	53,587
Straits Settlements..	144,818	165,412	160,812	209,257	145,794	176,377	70,748	82,899	5,777	5,535
Other British Possessions	2,367	4,355	2,362	4,563	1,349	2,135	200	1,162	1,185	2,493

Canned and Bottled Fruit with under 12% added Sugar: British Imports.*

(Duty 6d. per cwt. since April, 1906.)

From	1903.		1904.		1905.		1906.		1907.	
							cwt.	value.	cwt.	value.
								£		£
U.S.A. Total							49,674	72,138	103,018	167,981
Total from Foreign Countries.. ..	Until	April,	1906,	in cluded	in abov	e Table.	58,101	84,691	122,741	206,029
Straits Settlements..							83,360	94,494	210,759	236,860
Other British Possessions							..	..	1,871	3,431

*** Note.**—The British imports of fruits canned or bottled without added sugar are not given here, as only a small proportion, less than 2 per cent. in 1907, comes from the Pacific coast. Nor does it seem desirable to give the figures for fruit in thick syrup, less than 1,400 cwt. of which were imported in any of the years.

Dried Fruits: British Imports.

(Includes pears, but not figs, dates, prunes, raisins, or currants.)

From	1903.		1904.		1905.		1906.		1907.	
	cwt.	value.	cwt.	value.	cwt.	value.	cwt.	value.	cwt.	value.
		£		£		£		£		£
U.S.A Total	37,978	59,400	22,128	34,805	12,985	21,143	21,197	42,718	13,176	25,087
Total from Foreign Countries.. ..	34,944	63,028	26,139	42,646	14,589	25,164	23,113	47,132	15,845	29,896
* Total British Possessions	2,778	4,742	2,409	2,892	2,948	2,685	1,051	1,604	1,822	1,413

* NOTE.—Canada supplies most.

Raw Pears: British Imports.

From	1903.		1904.		1905.		1906.		1907.	
	cwt.	value.	cwt.	value.	cwt.	value.	cwt.	value.	cwt.	value.
		£		£		£		£		£
U.S.A.	77,871	116,942	35,136	36,024	106,426	94,298	99,746	87,402	24,275	26,442
Cape Colony	53	130	251	628	548	1,288	1,653	4,079	1,723	7,073
Australia	5,376	5,850	3,921	5,430	5,077	8,912	4,081	4,753	10,614	15,048
Total †	271,518	326,463	535,614	503,573	417,919	407,817	576,573	572,274	500,132	478,611

† NOTE.—Almost the entire supplies, other than from the three countries named, come from Western Europe.

Fruit canning has progressed considerably at the Cape during the past few years, and now the local demand for the kinds of fruit grown here is almost wholly supplied by local producers. The imports for 1907 of bottled or tinned and for dried fruits, are shown by the Customs Bureau statistics to have been as follows:—

Bottled or Tinned Fruit: 1907 Imports.

Cape Colony	468,942 lbs., valued at	£9,317
British South Africa	1,410,151 lbs., valued at	£25,928

Dried Fruit: 1907 Imports.

Cape Colony	1,136,060 lbs., valued at	£18,994
British South Africa...	2,560,795 lbs., valued at	£43,830

The figures for dried fruits cover dates and dried figs, of which practically none are produced in South Africa, and also dessert and sultana raisins. Pears probably constitute only a very small proportion of both the canned and dried fruit imports; and obviously if the Cape is to grow more pears, she must market them chiefly over-sea. The whole object of this article is to bring out the fact that a profitable and extensive market could be opened up in England for the canned and dried articles. If the Cape fails to take advantage of the opportunity, the trade that California is losing will probably pass more and more to foreign countries, and perhaps in part to Australia. The American Consul at Liverpool in a recent report commented on the rise in cost of American canned fruit in England, which he said was about 25 per cent. in the least four years and was resulting in an extension of the trade with Spain and Italy. The Cape

could easily keep the countries of Europe practically out of the market as regards canned and dried pears, and could more than hold her own against competition from anywhere else if the industries were extensively developed along sound lines. The suitability of the climate has been proved, and the fruit districts of the country are far better blessed with cheap and good labour than the farmers realise. At present South Africa is a better market for Cape canned fruits than is England, and an export trade in them has not yet become necessary. But the managing director of one of our largest fruit concerns, with an eye to future business, has carefully studied the relative cost of canning fruit here and in California, and is satisfied that with raw fruit at the same price the Cape could turn out the cheaper finished product. Moreover, he has carefully compared leading Californian lines with Cape samples and found that we need not fear ability to come up to Californian quality. Cape canned apricots, it may be mentioned incidentally, appeared distinctly the superior. As a further test of what might be expected, he sent Cape samples to England for an appraisal of their value, and had the satisfaction of receiving an equal quotation to that which was being offered for similar Californian grades.

Pears seem a particularly safe line for the Cape fruit grower now that the American West is becoming a diminishing factor in catering to the world's demand for them. The fresh fruit sells well in England, and can be transported thither with much less risk than is the case with stone fruits and grapes; and if the proper sorts are grown, the fruit that is not fit for the fresh fruit market or the cannery can be dried and the best of it still marketed over sea. The greatest drawback to pear culture is the length of time the tree takes to come into profitable bearing; but it is long lived, and when it is necessary the land can, by interplanting it judiciously, be made from the first to pay for its tillage. Both quantity and quality of fruit is necessary to develop an extensive canning industry. As above stated, the reputation of California has been made on the Bartlett variety, and it is not likely that an export trade from here could be worked up on a variety inferior as a canned product to that one. Moreover, California canners have demanded sound fruit above a certain size and plucked at a proper stage of development. Worm-eaten, misshapen, immature and over-ripe fruit has been rejected by them.

In conclusion, I beg to refer again to the opening paragraph above wherein it is stated that there appears to be an excellent opportunity for the Cape to benefit by what California is losing, and to the suggestion that practical fruit growers express their views on the matter. The subject deserves discussion by the Fruit Growers' Association in all districts where pear culture is commercially practicable.

CAPE FRUIT CONDEMNED IN THE TRANSVAAL

RETURN OF FRUIT FROM CAPE COLONY CONDEMNED BY PLANT INSPECTOR AT PRETORIA, DURING SEASON 1907-8.

March 18.—Western Fruit Company, Worcester: 5 cases apples, 5 per cent. Codling Moth, reconsigned.

April 14.—Western Fruit Company, Worcester: 3 cases apples, 5 per cent. Codling Moth, reconsigned.

April 14.—O. Mohamed, Constantia: 2 cases apples and 6 cases pears, infested with 3 per cent. Codling Moth, destroyed.

April 24.—Cape Orchard Company, Orchard Siding: 40 cases apples, 8 per cent. Codling Moth, reconsigned.

April 29.—V. Naidoo, Kuils River: 30 baskets pears, 6 per cent. Codling Moth, reconsigned.

May 4.—Denicke, Stellenbosch: 8 cases apples and 8 cases pears, infested with 2 per cent. Codling Moth, reconsigned.

May 15.—J. Goldstein, Graham's Town: 10 cases apples, 5 per cent. Codling Moth, destroyed.

May 15.—Cape Orchard Company, Orchard Siding: 10 cases apples, 5 per cent. Codling Moth, destroyed.

May 22.—J. Goldstein, Graham's Town: 10 cases apples, 10 per cent. Codling Moth, destroyed.

May 29.—A. A. Bhagot, Stellenbosch: 2 cases apples, 10 per cent. Codling Moth, destroyed.

SUMMARY.

Packages reconsigned, 94; Packages destroyed, 40; Total, 134.

FRUIT EXPORT.

Return of Fruit Shipped from Cape Colony during September, 1908.

Port of Shipment.	Destination.	No. of Packages.	Description of Fruit.	Quantities.	Value. £ s. d.
Cape Town ...	England	605	Oranges ...	91,794	272 4 0
" ...	"	185	Naartjes ...	28,042	51 11 0
" ...	"	13	Lemons ...	1,300	5 0 0
" ...	German South West Africa	9	Pines ...	751	7 16 4
" ...	"	16	Bananas ...	12,600	16 17 6
" ...	"	15	Naartjes ...	2,824	14 2 0
" ...	"	123	Oranges ...	99,430	117 13 6
" ...	"	90	Apples ...	12,820	61 7 6
" ...	"	9	Lemons ...	2,730	8 14 6
Port Elizabeth	England	1,833	Oranges ...	61,927	291 13 0
" ...	"	448	Naartjes ...	14,984	126 11 0
" ...	"	91	Pines ...	2,400	11 0 0

ANIMAL DISEASES—CONTAGIOUS AND INFECTIOUS.

Summary of Outbreaks of Contagious and Infectious Animal Diseases Scheduled under Act No. 27 of 1893.

Still under Quarantine on 30th September, 1908.

DISTRICT.	Anthrax.	Glanders.	Lungsickness.	Redwater.	Scabies	Sponsziekte.	Totals
Alexandria	...	...	...	...	...	2	2
East London	...	...	7	...	...	1	8
Gordonia	...	...	4	...	...	...	4
Hay	...	...	1	...	...	...	1
Herschel	...	...	...	...	...	4	4
Humansdorp	...	...	...	2	...	5	7
Kimberley	...	...	1	...	...	...	1
King William's Town	...	...	9	...	...	3	12
Komgha	...	...	7	...	...	1	8
Mafeking	...	...	...	...	...	1	1
Stutterheim	...	...	2	...	...	...	2
Victoria West	...	3	...	...	...	...	3
Vryburg	...	...	1	...	...	...	1
Tembuland.							
Umtata	...	...	12	...	...	...	12
Engcobo	...	...	19	...	...	...	19
Mqanduli	...	...	28	...	...	1	29
Transkei.							
Butterworth	2	...	8	...	...	1	11
Kentani	2	...	26	...	...	18	46
Nqamakwe	...	...	14	...	3	...	17
Tsomo	...	...	7	3	...	...	10
Willowvale	...	...	14	...	...	5	19
Port St. John's	...	...	1	...	...	...	1
Pondoland.							
Ngqeleni	...	...	6	...	...	...	6
Lusikisiki	...	...	3	...	...	...	3
Tabankulu	...	...	28	...	...	...	28
East Griqualand.							
Mount Ayliff	...	...	4	...	...	...	4
Umzimkulu	...	...	...	...	...	1	1
Qumbu	...	...	16	...	...	...	16
Tsolo	...	...	33	...	...	...	33
Mount Frere	...	...	8	...	...	...	8
Totals	4	3	259	5	3	43	317

J. D. BORTHWICK, Chief Veterinary Surgeon.

Office of the Chief Veterinary Surgeon,
Cape Town, 4th November, 1908.

NOTES ON OSTRICH PARASITES.

By W. Robertson, M.R.C.V.S., Director of the Veterinary Laboratory, Graham's Town.

The intestinal parasites which infest the ostrich with the greatest frequency may be classed under three varieties:—The Tape Worm, the Wire Worm, and a new arrival on the scene akin to the Guinea-Worm of man.

The Ostrich Tape Worm is not amongst the largest of its species, rarely attaining a length of over three feet. Before describing its structure in detail it may be interesting to glance at a few of the characteristics of the genus to which it belongs.

The "Cestodes" or Tape Worms are parasites, the body of which is in the form of a narrow band divided into more or less distinct segments. One of the extremities—termed the head and generally expanded—has a fixation apparatus formed of suckers and frequently of hooks. The nervous system consists of two longitudinal cords united at the head. There is no digestive apparatus, the nutritive materials in the intestine of the animal infested (host) passing into the body of the parasite direct through its skin. There is no breathing apparatus, the exchange of the gases also taking place through the skin.

Each segment of a Tape Worm is Hermaphrodite (possesses both male and female organs), and as each lot of eggs in these segments becomes ripe and fertilised that segment breaks off and is passed away in the dung as can be noticed (the nits) in any kraal or veld where birds are so affected. It will thus be seen that any remedy to be of any avail must remove or expel the parasite's head, otherwise simply the ripe segments from the free end are parted with and in time grow again.

The greater majority of our domesticated animals suffer from Tape Worm, and the numerous species are distinguished from one another by their dimensions, the forms of their segments, and the presence or absence of hooks in the head.

Tape Worms require two different species of animals through which to pass before they complete the cycle of their existence. Just as the egg of the Liver Fluke when leaving the sheep must in its next stage pass through the body of the water snail before re-entering another sheep, so must the eggs of a Tape Worm expelled by an animal pass through the body of some other before entering the system of one of the first species.

Take an example. Man is affected by a Tape Worm (*Taenia solium*), the eggs of this pass out in the faeces as ripe segments, these are eaten by the pig, the eggs hatch and develop in the muscular tissue of that animal's body into the small little watery bladders known as measles, man eats pork containing these bladders, from them Tape Worms hatch out and attach themselves to the intestinal lining, and so on. In the same way dogs suffer from a Tape Worm, the eggs are expelled with the faeces and sheep pick them up on the veld, the bladder forms in this animal's brain and produces Mal Kop, Sturdy or Gid. The sheep dies or is killed, the dog eats the head and completes the life cycle.

In hill sheep farms in Scotland where the sheep are worked by dog.., these animals are regularly dosed for Tape Worm, and the heads from any cases of sturdy are always carefully burnt. There are many Tape Worms whose life cycle we do not know, just as there are many bladder worms whose fully mature stage are unknown, and it materially simplifies the prevention of parasites when such knowledge is at our disposal.

Ostri stomach split open, showing the line of sepa ion between true st nach where nhabit and the gizzard in grinding portion A. Gullet. B. True omach. C.

The Ostrich Tape Worm (*Taenia struthionis*) runs to about two or three feet in length, seldom longer, and has a distinct head with a proboscis, four suckers, and an armed rostrum or beak fringed round with hooks (see photo).

Tape Worms are principally met with in young birds.

Treatment.—Many agents are advertised for their removal, turpen-

I find common petrol, as used in motor cars, a cheap, effective, and safe agent. Give from three to six ounces, according to the age of the bird, fasting.

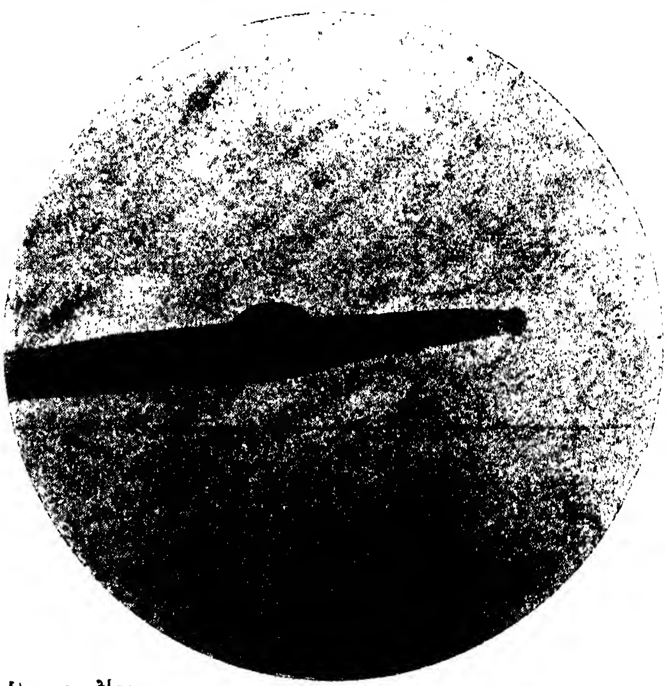
Ostrich stomach in natural position. A. Entrance from gullet. B. Exit into intestine. White lines show the area most infested with Wire Worm, and low the organ must be filled before the drug can be brought into contact with the parasite.

I have used this preparation largely in weakly and poor birds, and have not yet had a fatality. It is curious to note how long the smell of the petrol will persist in an ostrich's gizzard. I have distinctly noticed the odour there days after when making a *post-mortem*. Petrol costs about 2s. 6d. per gallon.

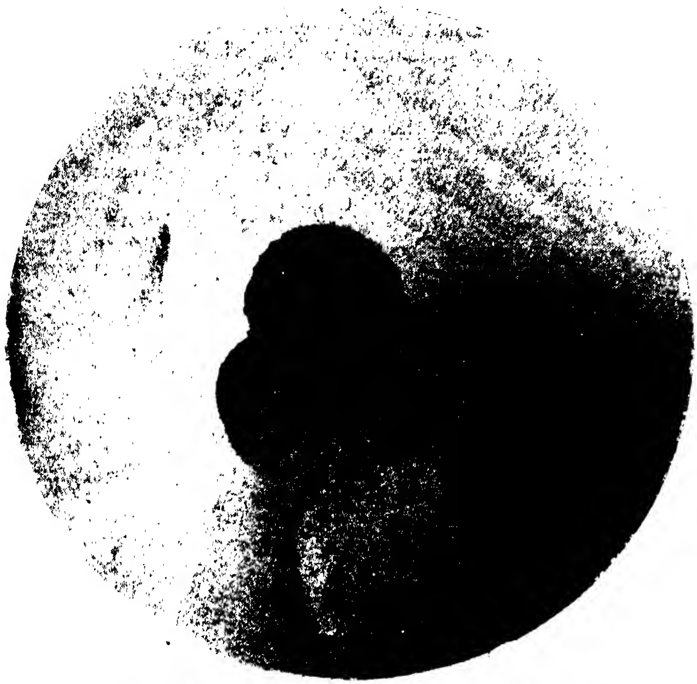
The Wire Worm.

Strongylus Douglasii are met with in the upper half or rather two-thirds of the stomach (Proventriculus), not in the true gizzard at all, and firmly attached to the membrane principally near the entrance of the

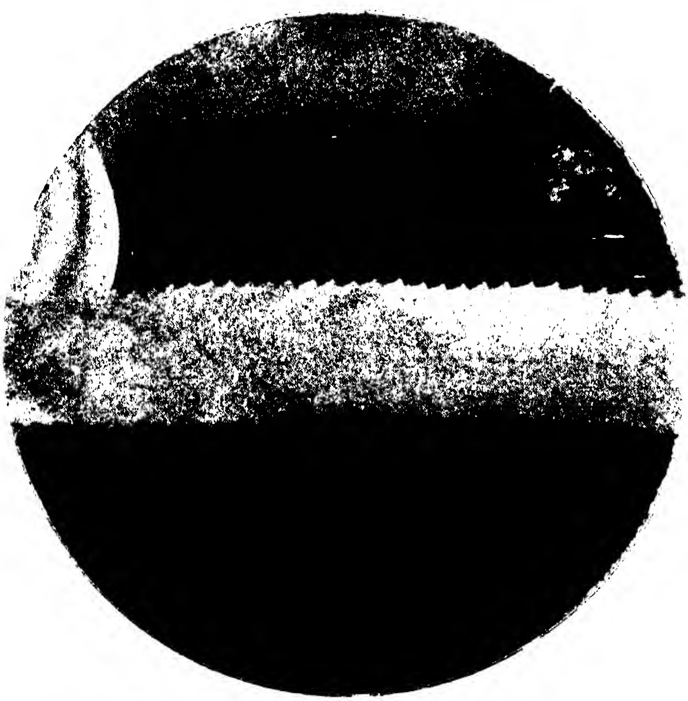
Wire worm from Ostrich (*Strongylus Douglasii*), magnified 12 times.



Head of *Strongylus Douglasii* female, magnified 50 times.



Head of ostrich Tape Worm, showing hooks and suckers. Magnified 50 times.



Mature segments of the ostrich Tape Worm. Magnified 12 times.

oesophagus. By their irritation they cause the formation of a thick, starchy film, which further protects them against external influences such as drugs.

The accompanying photo will show the difficulty of dealing with these parasites. The worms are at the upper end and the whole organ must be filled with fluid before it can come in contact with them; this is almost impossible, as the lower end is open and gravity will cause the fluid to escape that way.

Treatment: So far Carbolic Acid and its preparations have met with the best success, and while on the treatment for Wire Worms I would like to say that when one is experimenting with remedies for this parasite, it is necessary to kill a good many birds in order to accurately observe results. It is no good to dose birds, and because they appear to pick up in health to attribute the improvement to some remedy. Again, all the Wire Worm will disappear from a bird's stomach shortly after death, say over night, being dissolved in the stomach juices. With the endeavour to obtain some remedy for Wire Worm less drastic than carbolic, I think I have ransacked the Book of Drugs, and latterly have tried with much success the following—grasping the difficulty of getting the fluid drugs into direct and certain contact with the parasite. I give lime followed by Sal. Ammoniac. This drug, in the presence of lime, gives off free Ammonia (anyone can try this experiment by adding a solution of lime to a solution of Sal. Ammoniac, and the smell of the gas will at once be noticed) which is most hurtful to animal life.

I starve the birds, and give a dose of Paraffin, and five hours after give an ounce of Lime in half a bottle of water, followed at once by an ounce of Sal. Ammoniac in another bottle of water. I have never seen a bird the least disturbed by the dose, and its action upon the Wire Worm is most effective. I have killed many birds twenty-four hours after drenching (birds from that lot having been found teeming with the parasite) and have had the greatest difficulty in finding a few Strongyles, and there is a freedom from the excoriated or burnt condition of the stomach which frequently follows the drenching with carbolic acid.

This dose can be repeated in a fortnight.

I do not hold or claim that this is an absolute eradicator of Wire Worm, but I think it has proved sufficiently successful in experiment to justify its trial, on a large scale, by the practical ostrich farmer, to whose attention I commend it.

POULTRY ON THE FARM.

A SERIES OF PAPERS SPECIALLY WRITTEN FOR PUBLICATION IN THE "AGRICULTURAL JOURNAL" BY MEMBERS OF THE CAPE TOWN AND WESTERN PROVINCE POULTRY, PIGEON AND CAGE BIRD SOCIETY.

INTRODUCTION.

By F. LINCOLN LEAK

The object of these papers is to endeavour to place before the farming community the great advantages to be gained by paying more attention to Poultry Culture. It is to be feared that most farmers in South Africa are rather sceptical as to the benefits arising from keeping good poultry, and in other cases it is thought to be too small a matter to bother about. The writer has been warned that any attempt to interest our farmers in this matter is foredoomed to failure and is a sheer waste of time and energy. However, considering the great number of hands through which the *Agricultural Journal* passes it will surely be surprising if some readers are not found who are willing to devote a little thought to the views set forth, and be open to conviction upon matters of fact which may be new to them. Even the most prosperous of our farmers can probably recollect when they have felt the squeeze of hard times and when they would have been glad of any small auxiliary helps to meet their expenses. But if those farmers who are in the habit of looking upon poultry as a very small thing only knew what has been accomplished in Denmark, France, Great Britain, America, and—to come nearer home—in the Orange River Colony, they would soon change their minds upon this point, and recognise the great importance of the industry as a factor in the production and prosperity of South Africa. It is intended in these papers to deal with poultry as an adjunct to ordinary farming and not as a separate industry. A farm run especially for poultry needs very careful and experienced supervision and great practical knowledge in handling large numbers of poultry and manipulating incubators and artificial rearers. However, there is no need for the farmer who wishes to improve his poultry to worry about this. If he will only be persuaded to set about it in the right way the means of improvement are simple and need not be at all expensive. The point that first occurs to one is the farmer's strong conviction that pure-bred poultry stock is of no use to him. He believes they are sickly, cannot produce strong chickens and do not lay as well as the "Boer Hoender." Now the curious thing about this argument is that the same men who think this in regard to fowls at once concede the ad-

vantages of breeding from good strains of cattle, horses, sheep, goats, pigs, and other livestock, and will make sacrifices to obtain good specimens of pure bred stock. It must be admitted though, that in some cases the farmers' point of view is justified, for some breeds of poultry have been weakened in their vitality and true character by breeding exclusively for show points and being reared under unnatural conditions. On the other hand there are many breeds which for size, stamina, and laying qualities, can no more be compared to the boer fowl than a thoroughbred horse to a donkey. These are the kinds of poultry our farmers should keep, and they would soon be able to satisfy themselves as to the relative values of the purebreds and mongrels. As a temporary means of improving the size and laying qualities of poultry, the use of good pure-bred cocks for crossing with the best of the common hens is effectual, but there is by no means the same reliability about the results as is obtained by the use of pure-bred stock on both sides and the method has other disadvantages which will be referred to later. As for crossing two pure breeds together it is difficult to say anything in recommendation of this process. The progeny will probably be good layers, but have no fixed characteristics, and cannot be relied upon to produce good stock in turn. This matter of cross breeding has received great attention at the hands of scientific breeders, who have after much experiment succeeded in fixing certain breeds which combine the qualities most desirable for utility purposes, and it certainly would not pay the farmer to experiment with the idea of making his own breed. The different breeds will be fully described and compared in due course, but I may say my own experience is all in favour of the Wyandotte, which I think is the ideal fowl for South Africa. Perhaps this is due to the fact that the breed has been made and brought to perfection in America where the climate is a much nearer approach to our own than in Europe. In the Wyandottes very great attention has been devoted to utility points, and I may instance a pen of White Wyandottes lately imported (by Mr. J. G. Lay, the American Consul). The three hens have laid respectively 207, 208 and 211 eggs in a year and the mother of the cock 241. These records are reliable, and were obtained by trap nests.

Which would pay the farmer best to keep, these Wyandottes, with an average egg production of over 200 per year, or the boer hen with about 60? But the best strain of fowls ever bred would not lay well on the food they would get on the average South African farm. On many farms the ration allowed for the poultry is scanty in the extreme, and where they do get enough, it is very rarely the right kind of food to favour egg-production. Any kind of food which causes fowls to lay on fat instead of flesh will have a bad effect upon egg production. This question of feeding will be fully dealt with in due course, and it need only be said here that proper feeding is considerably more than half the battle in obtaining a good egg average.

Another important point is housing. Of course, the farmer does not like to go to much expense in poultry houses, and generally speaking, there is very little need to do so, for a great deal can be done with the natural resources available on most farms, but at the same time it cannot be expected that good results will follow, unless the fowls have proper protection from the cold and wet. I have seen in some parts of the Karroo fowl houses constructed of loose stones, which would be about as cold and draughty a habitation as could be devised, and fowls that would lay well in such adverse conditions would be marvels. Now, if these houses were plastered inside and out with clay, they would be draught proof and comparatively warm. Whenever possible, poultry houses should be placed in a well-sheltered spot, protected from the wind by trees or bushes.

Now, in regard to poultry farming generally, it is an occupation which the average farmer can take up without the slightest risk. He need not necessarily keep a large number of poultry to start with, and could gradually increase his stock as he felt sure of his ground, but, according to farming experts, there is no branch of farming which gives such good results in proportion to the time and attention bestowed upon it, and if it be taken up in this spirit it cannot fail to yield a very handsome profit. Moreover, it is a very interesting branch of farming, and one in which many ladies show keen interest. It would add largely to the pleasure of life on isolated farms if some good breed of poultry were kept in which the owners would take a pride and delight. The farmer who succeeded in breeding first-class stock would have an outlet for it in all directions, and it may be added that the farmer should have no difficulty in beating the amateur fancier at his own game, owing to the natural conditions in the country districts being so superior, and the birds, if properly looked after, are bound to be stronger and hardier than town-bred birds. We had a striking instance of this on the last open Poultry Show held at the Drill Hall in Cape Town last July. A Buff Orpington Cock shown by a Malmesbury exhibitor was greatly admired. He was a magnificently-grown bird, and when put up for auction evoked keen competition, and was knocked down for £6 12s. 6d. When the farmer talks about the difficulty of rearing poultry, diseases, etc., he has no conception of how much better off he is, generally speaking, than the town fancier, and yet the latter manages to rear almost perfect specimens of the various breeds, good in stamina as well as appearance.

There are now a number of Poultry Breeders in the vicinity of Cape Town who are making a special study of utility poultry, and are using only guaranteed laying strains in the production of their stock. It is this class of stock that the farmer needs to start upon a good foundation. The encouragement of poultry farming by the Governments of the Orange River Colony and Transvaal has had a most beneficial effect upon the industry in those States. The Orange River Colony is able to supply all its own requirements in the way of eggs, and export a considerable surplus to the Transvaal and elsewhere. Our farmers are wrong in regarding the poultry industry as a small thing. In other lands it has become a very big thing, and no farmer can afford to despise an adjunct to his resources which may prove of great value in the event of failure of crops or other stock and bad markets. The more strings a farmer has to his bow, the better is he able to cope with bad times. There is always a sure and good market for fresh eggs and table poultry. The latter branch has never been catered for at all in South Africa, and consumers have practically got into the way of relying upon the imported dry and flavourless frozen poultry.

On many wine and fruit farms the land is well suited for poultry-raising, and the fowls would benefit the crops by keeping down insects and by their manure, but some efficient system of housing must be provided to afford shelter in bad weather and protection from their natural enemies. A great deal has been said about poultry diseases, but fanciers in the Cape Peninsula are able to keep large numbers of fowls with very slight losses from disease, and unless farmers are prepared to give a reasonable amount of attention to their poultry in respect to regular feeding, suppression of insect pests, and breeding from healthy stock, then they had far better leave poultry alone. A great deal of disease arises from overcrowding, in-breeding, and general neglect, and I think I may safely say that all poultry diseases are preventible.

I would conclude by urging all South African farmers to give this matter their earnest attention. In so doing they will be fulfilling a duty to the country and providing themselves with a further source of produc-

tion and income. I may add that the W.P.P.P. and C.B. Society will always be glad to answer any inquiries of general interest through the pages of this *Journal*, and I also feel sure that if there were a general demand for special classes in the shows for utility exhibits by *bona-fide* farmers, such demand would be met by the Society. The papers to follow are published by authority of the Society, which, however, cannot undertake to identify itself with all the opinions of the different contributors. I trust the articles may have the result of inducing at least some of our farmers to take up poultry breeding, and the example of the more progressive would soon be followed by others.

BREEDING AND REARING AND USE OF THE INCUBATOR.

By Fred. T. Hobbs.

As this is being written principally for the benefit of the farming community I shall, as far as possible, only touch on the utility side of poultry, and trust that some good may result. The first thing we have to consider when thinking of going in for breeding stock of any description is, what do we want to do?

Are we anxious to supply the market with poultry for killing? or do we want to make egg production the principal object? Also, are we going to make poultry-keeping one of the principal parts of our farming? or is it only to be a side line. Next must be considered as to where the principal market is to be found. Do we intend to market the product ourselves? or do we intend to simply attend to the production and forward same periodically to agents for disposal? We must also consider the climate of the district we live in and the general surroundings. All the foregoing matters must be thought out if success is to be obtained, and it is the same with poultry keeping as with all other business matters. The man who devotes sufficient thought to the matter is the man who makes success. Situated as our country is at present, there is not sufficient population for the laying out of large plants purely for poultry and egg production, and therefore it is as a side line to general farming that poultry can be made to pay. It is also generally found that the demand for poultry and eggs is of a fluctuating nature, and the seasons when the demand is greatest must be carefully considered. From general observation it will be found that egg production is by far the most profitable side of the industry in this country at present, and that when making it the principal object, that there are still plenty of surplus cockerels and old hens to supply the demand for killing stock, and there are many breeds that combine both qualities, and the same will give general satisfaction.

Having come to a decision as to what we intend doing, all going well, we will next consider the stock we intend going in for. We must be very careful over the matter, and weigh all points ourselves, as it is not advisable to ask the opinion of too many friends, and then, if failure in the end results, blame them. Ask advice freely, read as much as possible, and learn everything available, and then decide yourself, and bear the responsibility, and there is little fear of failure in most cases. In considering Breeding Stock it is essential that the same be perfectly sound and vigorous, and that they be not only pure-bred, but thorough-bred. This is more important in many respects in dealing with utility, than it is in purely fancy birds. By thorough-bred I mean birds that have been bred for certain definite purposes for many generations. Such as laying qualities, laying and table combined, and such like, these will produce progeny

of like qualities to themselves, and thus one knows what to expect at the end of a season's breeding. Many birds may be pure-bred, but they are the outcome of crossing many strains of the same breed, and frequently different strains have been bred for different purposes, and thus when put together the combination may produce certain points, but often the utility qualities are damaged. Unfortunately, pure-bred stock have got a rather bad name in many parts, owing largely to the buying of tip-top show specimens, that have been kept confined and pampered to prepare same for the show bench. These birds are practically useless to the average farmer, whereas their brother cockerels that have roughed it are often of great value. Therefore, when buying or choosing birds to breed from, only take those that have never been pampered in the least. You may find their plumage slightly discoloured by the sun, but otherwise they should be true specimens of their breed. I cannot recommend the buying of what fanciers term "culls," as I maintain that, no matter for what purpose birds are required, they should be as near to standard requirements as possible, except for the due allowance being made for the discolouring of plumage by the sun, etc. This is especially necessary if one considers the manufactured breeds, as the "culls" or mis-marked birds from these are generally the outcome of Nature's struggle to revert back to original ancestors, and thus same are little better than cross-breds.

It is far better to pay a good price and get what you want, than to pay a medium price for a make-shift, for when one considers the original cost of stock-birds, spread over the resulting progeny, it is not great, and the difference between the medium and best article is often but a few pence per chick, and the value of the chick may be doubled or trebled.

The breeding of thoroughbred birds is gradually being taken up, and the laying competitions will stimulate breeders, and before many years have passed we ought to have strains of birds out here equal to the best found in America, Australia, or England, so far as laying qualities are concerned We have a splendid climate and everything in our favour, and it is the duty of every Colonist to endeavour to improve and beat other countries, and so eventually not only supply our own markets, but be able to export, and to export birds of the best quality, so as to cause a good demand for them

Having obtained the birds to suit your requirements, the next point is to arrange for their general treatment. It is not wise to turn them loose on the yard, as they cannot then receive proper attention, but as they will be the parents of the chicks for the season, they should have a good-sized run and such food as will promote strength and activity. Never should they be over-fed or given too much soft feed or foods of a very fattening nature. Give plenty of green stuff, a fair amount of animal or insect life, and vary the grain, letting the largest amount consist of short oats if they are available, and in wet and cold weather a fair proportion of mealies will do more good than harm. Bury some grain each week, either under stable litter, or dig it into the ground, and the birds will ever be active, and the grain will supply a different variety of food in its swollen and sprouting state. On some farms it may be possible to put the breeding stock into an orchard or garden, away from other birds, and without doubt such conditions are by far the best, and there being such a large natural supply of food among the vegetation, much trouble will be saved. But on dry farms and such like it will handsomely repay the farmer to give proper attention to the breeding birds, as unless they are kept full of vigour and activity, the chicks resulting from them cannot be expected to thrive well. Another most important item is to see that plenty of sharp grit and shell is available, as otherwise the birds cannot digest their food properly, and the digestive organs will eventually become disorganised and affect the whole system.

Hatching the Eggs.

We will now consider the different methods of hatching the eggs. Some prefer the old method of the hen, others the incubator, but the use of either depends very largely on the requirements of the farmer—whether he intends breeding on a large scale; whether he has plenty of time and accommodation for foster mothers, and many other like reasons; and these can only be considered and decided upon by the farmer himself. I will, however, give certain reasons in favour of both, and methods of treating both, and leave readers to see which suits them best.

The advantages of the hen are: If she is a good setter, she will look after the eggs, keep them warm, turn them, and, all being well, will hatch the chicks safely. Then she will attend to the chicks, keeping them warm, and often protect them from danger.

The disadvantages are: Some hens cannot be trusted, and often eggs are broken, chicks killed when hatching, and occasionally the whole of the eggs spoilt by the hen leaving the nest. Then when she has her chicks, she often transfers lice to them, and these soon cause the youngsters to droop and die, unless got rid of. Hens also have a remarkable habit of only going broody when they like and not when you want them to, and thus cause much disappointment and annoyance.

The incubator's advantages are: That you can work it any time of the year that suits you, and according as you require, so you can get almost any size you like, and thus hatch large batches of chicks at a time. It also gives you the chick quite free from lice, which is a great comfort.

The disadvantages are not the fault of the incubator, as a rule, but nearly always the operator is to blame, or else the eggs.

It is absolutely essential that the incubator be attended to regularly, and unless one makes up one's mind to do so, leave it alone. Otherwise it will not work properly, and eggs may become chilled or over-heated, and the whole batch of eggs spoiled, or, if the chicks do hatch, many will be deformed, having crooked legs, etc. Then, with the incubator, one is apt to hatch many more chicks then they can accommodate, or attend to properly, and the result is that most of them die or are stunted in growth.

Further, having got the chicks, they must be transferred to a foster mother, and these need a good deal of attention, and, like the incubator, must not be neglected. Thorough protection, by wire or otherwise, must also be given the chicks, otherwise vermin of different kinds will soon reduce the number.

Treatment of Broody Hens.

When using broody hens for hatching, treat them as near to Nature as it is possible. Make the nest in a quiet, secluded spot where nothing can disturb it, on the ground under a bank or other sheltered, cool place is without doubt the best. Hollow out the ground in a basin shape, not too deep, and place in some chaff and a few dummy or unfertile eggs, and towards dusk transfer the hen to the nest. If she is an old hen that has had chicks before, she will, as a rule, take to the nest at once, and give little further trouble. But should it be a young hen, it is advisable to cover her in for the first day until late in the afternoon, and then let her off to feed, etc., and should she return herself to the nest, it will generally be safe to give her the setting of eggs. If she bothers, and has to be driven back, wait a day or two until she settles down. Never hurry, otherwise losses may occur, and it generally happens with the best eggs, unfortunately.

In very dry climates it is often advisable to damp the ground around the nest about once a week, according to the weather, as occasionally, owing to the excessive heat and drought, the eggs appear to dry up too rapidly, and the chick is thus weakened, and often dies in the shell.

As a rule, thirteen eggs are quite sufficient to place under one hen, and though she may appear large enough to take more, it is not worth risking, as the eggs are shifted many times, and it is possible for one to be exposed from time to time and get chilled, and thus many eggs may be spoilt. But if it can be managed, set two or three hens at the same time, and if the hatch is good, divide the chicks among two of the hens, giving them up to eighteen each if the weather is warm.

The hens should be examined before being set, and well dusted with insect powder. It often repays to look over them, and the nest as well, during the period of setting, as lice are a great pest, and occasionally cause the hen to forsake the eggs. Also when chicks are hatched give the hen another good dusting before placing with the chicks.

As the chicks hatch take them away from the hens, but only disturb her every four hours or so, removing the empty shells and all chicks that are dry, and do it quietly, so as not to excite her more than can be helped. Put the chicks in a box or basket, and keep well covered up until the hatch is completed. Then treat the hens as above described, and also give them a good feed and drink, after which place them in a coop, and divide the chicks amongst them.

The coop can easily be made out of some box, with a few laths in front, the laths to be close enough together to prevent the hen squeezing through. Let the coop be as large as possible, say, not less than 2 feet square, and place it in a sheltered spot, under the trees, moving it on to fresh ground as often as you can.

Treatment of Incubator.

It is not possible to give better advice for the general treatment of an incubator than is found in the books of instructions sent with each machine by the maker. If those instructions are adhered to, and providing the eggs are good and from vigorous stock, a good hatch is almost certain, but from observation I find that many who go in for incubators object to do the small necessary details, and hence failures. Unless anyone is prepared to do things regularly and systematically, leave them alone, but don't blame the incubator for your own neglect.

The principal things to observe are:—

Plenty of fresh air with as little draught as possible.

Absolute cleanliness of all parts of the machine.

Regularly clean, trim, and fill the lamp.

Keep the machine in as cool a place as possible, and one where it is not likely to be jarred or shaken.

And use only quite fresh eggs from vigorous stock, and turn them twice daily at regular intervals.

Note the altitude you are living in and refer to book of Incubator instructions *re* same, as the altitude affects the heat required and many machines have special capsules, etc., to suit the various altitudes.

I have worked different machines, and seen others work various kinds, but seldom has failure resulted, except when either the eggs were old or from weak stock, or else the operator of the machine neglected to carry out the instructions given by the makers.

As regards size, I think the 50 and 100 egg machines the best for general use and the cheapest in the long run. I have had splendid results out of 25 and 30-egg machines, but the cost of oil is less in proportion for the larger machines, and thus for anyone wishing to hatch a number, the larger are the cheapest in the end. For the average breeder, larger than 100 egg will prove cumbersome.

Turning Eggs, and removing same across the Machine.—I have tried every way, and have found that if the eggs are good, just turning them half way twice daily and leaving them in the same position in the drawer always, cannot be improved. But test out unfertiles and remove them, and also dead germs as soon as discovered, as this is most important.

When chicks have hatched and are properly dry, they can be removed to the foster-mother. The foster-mother must also be treated fairly and according to instructions by the makers. Perfect cleanliness must be observed, and regular warmth kept up, never allowing the inner chamber to get too hot, and don't overcrowd the chicks. Overcrowding is a great fault, and the average foster-mother is much too small for the accommodation of the number it is supposed to contain. I have generally found that even 50 is too many for the 100-chick one when they are a month old.

Feeding and Rearing of the Chicks.—The method of treatment varies very much according to the farm, and is entirely different to what the small breeder in the town with a small yard does. On the average farm a great quantity of food is always obtainable, such as green stuff, insect life, etc., and the principal thing is to place the hen or the foster-mother under shade in a sheltered spot where the chicks can roam at will and scratch under trees or amongst vegetables, and thus obtain the best food possible. Remove the hen or foster-mother frequently so as not to let the ground get foul, and thus keep them as clean as possible, always leave plenty of clean water with the hen and feed her well.

The first food for the chicks can consist of any unfertile or stale eggs boiled hard and mixed with bread crumbs or coarse oatmeal. This can be continued for a few days, and then stale bread soaked in milk and dried off into a crumbly state with either oat or Boer meal, will be found cheap and of beneficial effect if given once or twice daily, say first thing in the morning and about 2 p.m., and can be kept up from four to six weeks. A little cracked corn or other small seeds such as N'youti, millet and others, that may be available, according to the district you live in, can be given about 11 a.m. and last thing in afternoon, but chicks with a free range do not require much, and thus they must not be encouraged to hang about the coops by over-feeding, but everything done to encourage them to be as active as possible.

From six weeks up to three or four months a little food three times a day will assist growth, and let the food be as varied as possible, say soft food, composed of stale bread, house scraps, etc., mixed with skim or butter milk, and dried off with bran and boer or barley meal, say four of bran to one of either meal will be suitable and not costly.

Grain can be given at midday and evening, and can consist of cracked mealies, wheat, and small grains, also short oats if available, but on no account *long oats* or *whole mealies*. Let the bulk be chiefly small grains if possible, and the wheat, crushed mealies at evening would be the best.

If farmers would arrange to have a few movable houses, the youngsters would, after four months, do grandly if placed on the stubble lands, and would earn their living by devouring the shed grain and many seeds of various troublesome weeds, also insects, grubs, and other pests, and their extra feed would not be much, just a little morning and evening being generally enough. The houses should be shifted to various parts of the fields from time to time, thus allowing the whole of the ground to be gone over by the young birds and preventing any portion becoming foul. It must not be forgotten either that the birds while destroying the land pests, such as weeds, grubs, etc., are at the same time fertilizing the soil and improving it vastly for the next crop.

The cockerels should be separated if possible, and be put as far away from the pullets as can be managed as soon as they commence crowing and are troublesome. It would repay most farmers to either sell or caponize them at that age, as at four months young cockerels are generally in grand condition and heavier than they look, and at five and six months they often appear larger, having grown in frame, but they are often not so fleshy and are covered with fine feathers. If they are caponized, their growth will be temporarily stopped, but the ultimate quality of their flesh will be greatly improved and they can then run with the pullets and do no harm. In England and America, the value of capons over cockerels is often double, and the public have only got to try them and the demand will soon be beyond the supply. The young cockerels also at four months will realise often more than the larger framed birds, owing to the quality and amount of flesh on them.

It is impossible to give any hard and fast rule as to the amount of food or even kind of food to be given, as farms vary so much in what they have available naturally, but the principal things to bear in mind are that active chicks are healthy ones, and the food given should consist as far as possible of such as will assist growth by forming bone and flesh with enough fat to keep the body healthy only. Many farmers will find that it will repay them to buy a bone-cutting machine, and cut up all the bones they may have from time to time and feed them to the growing stock and laying hens. It is recognised as a specially good feed in promoting growth and assisting egg production, and in many parts of our colonies bone is absolutely necessary in some form, as phosphates appear to be very scarce in the soils, and hence all growing stock suffer unless supplied with it.

The Best Time for Hatching.—It will be found that the best time for hatching ranges from July 1st to the end of October, and birds hatched in those months grow rapidly and generally come on to lay in the autumn, and continue through winter. It is not advisable to hatch all the year round, and it will prove unprofitable in the long run. If birds are hatched and properly attended to during the months mentioned above, there will always be a good egg supply, providing also that the birds bred are from a good laying strain.

Farmers should keep a record of the cost and return of their poultry, and they will soon realise their value and pay more attention to them, and it will prove a valuable asset if the birds' houses are cleaned out more frequently and the manure carefully looked after, as its value as a fertilizer is very high, especially when green bone forms a portion of their feed.

As our colonies are at present, I can scarcely advise the breeding of large quantities of birds, but what is required is the steady improvement of the quality of birds a farmer keeps, and he should realise that it is far better to keep 100 hens that lay 150 to 200 eggs per annum, than to keep 200 hens that won't lay 100 eggs in twelve months. The cost of feeding and attention will then be lessened, and the return doubled, and the pleasure and satisfaction will be increased all round. Let quality be the aim of every farmer to start with, and then when quantity is required, he will soon be able to breed them, but on no account let quantity destroy quality, or failure will eventually be the outcome.

I have endeavoured to write to assist the farmers of our Colonies; there may be some items that do not meet with the views of fanciers, but the keeping of birds on a farm differs largely to keeping them in a town on a small piece of ground, and thus I hope that fanciers will realise this and think well before criticism, and I hope that what I have written may do some good even in creating thought *re* poultry matters generally.

[The series will be continued in the following and subsequent issues.]

MILK RECORD.

ELSENBURG COLLEGE HERD.

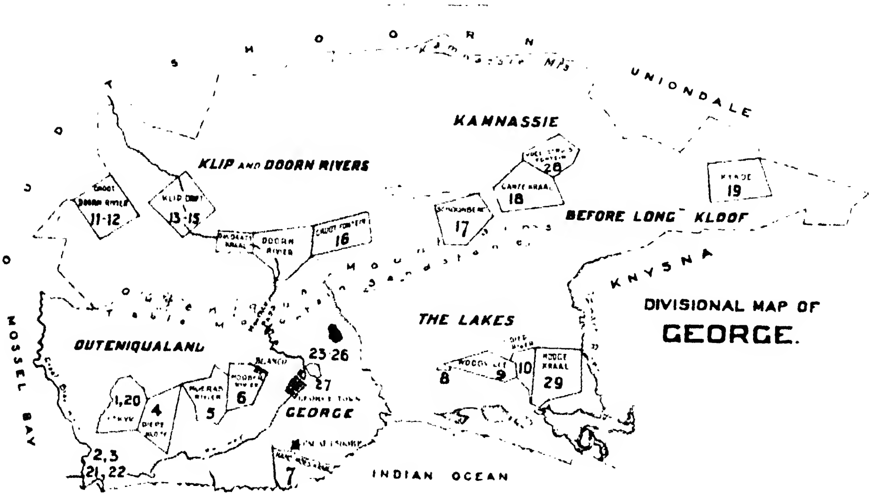
Subjoined is the Milk Record to the 31st October, 1908 :—

Breed and Cow.	Days in Milk.	Yield in Lbs. During October.	Yield in Lbs. Total to date.	Yield in Lbs. Daily Average.
FRIESLANDS.				
Cleopatra	254	711	9,648	37·98
Romula	229	781	7,022	30·66
Victoria	219	946	7,194	32·84
Bell	113	1,240	4,676	41·38
Violet	93	1,150	3,523	37·88
Rose	72	1,335	3,125	43·40
JERSEYS.				
Nora	274	490	4,753	17·34
Gladys	173	774	4,172	24·11
Gertie	135	765	3,524	26·10
Rosa	113	444	2,001	17·70
Grace	107	610	2,276	21·27
Gwendolen	76	476	1,112	14·63
Gilliflower	64	1,014	2,117	33·07
SHORTHORN.				
Maggie	113	1,003	4,062	35·94
AYRSHIRES.				
Cherry	156	380	3,448	22·10
Lobelia	131	592	3,289	25·10
Queen Dot	123	543	2,975	24·18
CROSSES.				
Bessie	354	686	11,434	32·29
Disa	229	545	4,898	21·38

THE AGRICULTURAL SOILS OF CAPE COLONY.

INVESTIGATION AND ANALYSES.

By C. F. Juritz, M.A., D.Sc., F.I.C., Senior Government Analyst.



(Continued from page 490.)

Humansdorp.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	—	—	A. C. Macdonald.
2.	—	—	,,
3.	Zitzikama.	Lot 7,899	H. G. Fourcade.
4.	,,	Lot 7,897.	,,

Two soils, Nos. 1 and 2, were taken in this Division from localities badly affected with "lamziekte," and where great mortality had resulted amongst the sheep: the soils, as will be seen from the table below, were found to be almost devoid of phosphoric oxide, although one was well stocked with lime and potash, and the other fairly so. Taken in conjunction with the analyses of the soils from the Albany Division,* it would appear that lack of phosphates rather than lack of lime is one of the fundamental causes of lamziekte. Almost throughout this Division the soil

* Vide page 180.

is entirely the result of the disintegration of the great ranges of Table Mountain sandstone, which extend along the south coast from George, and eventually die out in the Zitzikama Range. This sandstone contains practically nothing capable of affording nutriment to plants.

Samples 3 and 4 represent the average virgin soil of Storms River to a depth of twelve inches, and were taken from upland plateaux. The soil consists chiefly of fine quartz silt. The opinion of scientific agriculturists with regard to acid soils of this type is that plant food constituents are rendered available to such an extent by liming or cultivation that excellent crops are raised with moderate application of fertilisers.

The following are the analytical results obtained:—

(Method II.)

	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through 3 mm. Sieve.		
No.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	4·12	7·46	·024	—	·09	·07	trace.
2.	3·74	4·48	·005	—	·54	·13	trace.
3.	1·36	4·07	·053	·140	·101	·018	·005
4.	2·43	6·72	·060	·168	·089	·013	·008

IDUTYWA.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Ibeka.	Ibeka.	St. C. O. Sinclair.

One sample of soil was taken from, and may be considered as representative of, the sandy tract of country near Ibeka. It is, in all probability, similar in origin to the two soils, Nos. 1 and 2 on the Butterworth list,* taken in the vicinity of the old Residency at 'Nhlambe, in that district.

The results of the analysis of the soil from Ibeka are as follows:—

(Method I.)

No.	Percent. of Field Sample. Fine earth.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through ½ mm. sieve. Lime.	Potash.	Phosphoric oxide.
1	97·6	2·44	5·18	·0474	·133	·074	·027	·006

KENHARDT.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Kenhardt.	Rooiberg.	Dr. E. A. Nobbs.
2.	”	”	”

These two samples were collected from irrigable lands between the dam and the village of Kenhardt: the land consists, for the most part, of a fine red sand, of which No. 1 is an example, varying in depth, and passing into a red silt of even finer grain, No. 2.

* See page 322.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
3.	Kenhardt.	Rooiberg.	Engineer, Pub. Wks. Dept.
4.	,,	,,	,,
5.	,,	,,	A. G. Strong.

Nos. 3 and 4 were collected respectively from the front third and from the centre of the Rooiberg Dam. No. 5 had previously been taken from the site of the dam, as representative of the lands proposed to be irrigated.

The analyses of these samples are recorded in the following tables:—

(Method I.)

No.	Percent. of Field Sample. Fine earth.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through ½ mm. Sieve. Lime.	Potash.	Phosphoric oxide.
1.	55·9	1·90	2·88	·0039	·071	·454	·296	·051
2.	100.	2·24	2·85	·0025	·050	·320	·207	·069
3.	94·7	4·31	4·32	·1387	·057	·290	·348	·134
4.	95·0	4·60	4·54	·1116	·043	·420	·341	·145

(Method II.)

No.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through 3 mm. Sieve. Lime.	Potash.	Phosphoric oxide.
5	5·80	5·22	·0038	—	·999	·154	·156

Kimberley.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	No. 2.	Schoolplaats.	Dr. E. A. Nobbs.
2.	,,	,,	,,
3.	,,	,,	,,
4.	,,	Waterfall.	,,
5.	,,	Warrenton.	,,
6.	,,	,,	,,

As in the case of the Barkly West soils, the majority of the samples from the Kimberley Division were collected by Dr. E. A. Nobbs from a large extent of country proposed to be irrigated by means of water conveyed from the Harts River. Three samples were taken on the farm Schoolplaats. No. 1, a tough black alluvial clay, lying on a subsoil of silt, represents a heavy piece of land situated close to the Vaal, obviously very rich, but unfortunately limited in extent to a narrow strip along the banks of the river. No. 2 represents the eastern side of a wide low-lying bight of land on the same farm: it is a yellow fine-grained sandy soil. The central and western portions of this bight consist of a stiff loamy marl, grey in colour, typified by No. 3. On the farm Waterfall occurs a stretch of some 800 acres of a red gravelly loam, about 145 feet above river-level. The owner of the farm proposes to irrigate this land —whereof No. 4 is a sample—by pumping up water from the river below.

Two samples of fine-grained brown alluvial soil were collected at Warrenton, No. 5 a garden, and No. 6 a virgin soil: both of these are from time to time enriched by flooding and deposits of silt.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
7.	No. 1.	Kimberley Borough.	Supt. Sanitary Dept.
8.	"	"	"

Nos. 7 and 8 represent land within the area controlled by the Borough Council of Kimberley.

The following tables comprise the results of the chemical analyses of the soils collected within the Kimberley Division:—

(Method I.)

No.	Percent of Field Sample. Fine earth.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through ½ mm. Sieve. Lime.	Potash.	Phosphoric oxide.
1.	98·2	4·77	5·32	·006	·134	·168	·161	·119
2.	95·0	·59	1·17	·002	·035	·018	·039	·031
3.	94·5	4·83	9·01	·003	·171	2·860	·125	·068
4.	79·4	2·23	4·07	·002	·013	·142	·161	·064
5.	91·5	2·50	3·34	·003	·120	·278	·108	·074
6.	88·2	6·29	5·07	·006	·106	·346	·094	·070

(Method II.)

No.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine	Nitrogen.	Percentage of Soil sifted through 3 mm. Sieve. Lime.	Potash.	Phosphoric oxide.
7.	—	—	·032	—	·98	·18	—
8.	—	—	·036	—	3·24	·63	·07

No. 1. proves to be well supplied with every class of plant food, the analytical results thus confirming the opinion previously formed of the soil. The sandy soil No. 2 turns out to be far below No. 1 in chemical composition. The area whereof No. 3 is a type contains lime—largely carbonate—in abundance, it is well provided with nitrogen, and has a moderate supply of potash and phosphates. The Waterfall gravelly loam, represented by No. 4, lacks nitrogenous constituents, but has a satisfactory amount of potash, and a fair provision of lime and phosphoric oxide. The Warrenton alluvial soils may be described as chemically of medium quality.

King William's Town.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	No. 8.	Evelyn valley.	J. S. Anderson.

The only sample collected for analysis within this Division was a black loam, taken from some lands at Evelyn Valley, a forest station in the Eastern Forests Conservancy. The soil was stated to be so poor that nothing except trees will grow on it. The forest station is situated near the top of the Pirie Mountain, 4,200 feet above sea-level, and 40 miles from the coast almost due north of King William's Town. The surrounding farms all lie at much lower altitudes, ranging from 1,700 to 2,300 feet

below Evelyn Valley. The soil at these lower levels, where the annual rainfall ranges from 18 to 32 inches, has the reputation of being much more fertile than that at the forest station, which has a mean annual rainfall of 60 inches. The ground where the sample was taken had been broken up from the veld two or three years previously; the site of the sample was a gentle slope about 200 yards from the foot of a steep kopje rising to a height of 250 or 300 feet: the surface soil goes to a depth of from 12 to 14 inches, below which lies a red porous clay. Nearer the foot of the kopje the surface soil increases to two feet or more in depth.

The analysis of this soil resulted as follows:—

Method I.

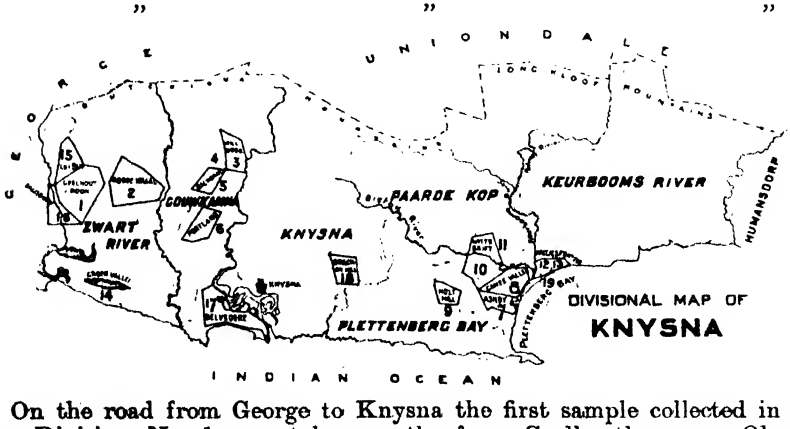
	Percent. of Field	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	97·5	6·26	16·60	·0205	·315	·050	·082	·105

The soil was fine in grain and contained a large quantity of nitrogenous organic matter; the proportion of phosphoric oxide was satisfactory, but lime was deficient, and the reserve of potash was not much better.

Knysna.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Zwart River.	Geelhoutboom.	C. F. Juritz.
2.	"	Roode Kraal.	"
3.	Gouwkamma.	Millwood.	"
4.	"	Portland Heights.	"
5.	"	Balmoral.	"
6.	"	Portland.	"
7.	Plettenberg Bay.	Ashby.	"
8.	"	Ganze Vallei.	"
9.	"	Holt Hill.	"
10.	"	Witte Drift.	"
11.	Paarde Kop.	Witte Drift.	"
12.	Keurbooms River.	Matjesfontein.	"
13.	"	"	"



On the road from George to Knysna the first sample collected in the latter Division, No. 1, was taken on the farm Geelhoutboom, or Olyvenhout Kraal, about six miles E.N.E. of Diep River, in the George Division;

No. 2 being taken from Roode Kraal, some 5½ miles further eastwards. At Sour Flats, called also Balmoral, No. 5 was collected, from a spot N.E. of the locality where the last mentioned sample was taken, and distant therefrom about ten miles by road. The soil is a light clay, fairly loose in texture; analysis shows it to be poor in all mineral plant food. As a matter of fact, these three soils are all derived from rocks of the Table Mountain series, and the exceedingly poor analytical results are only what one can expect under the circumstances: however, on a small farm, a few hundred yards nearer Knysna, good crops are stated to have been cultivated for ten years without manure. At Portland, between Balmoral and Knysna, lying about four miles south of the former place, and 19½ N.W. of the latter, a similar light clay, sample No. 6, was collected. Here again the analysis yielded poor results, for Portland too lies on Table Mountain sandstone. No samples were taken between this point and Plettenberg Bay. At the latter place a rather loose clay predominates, but the underlying rock is Table Mountain sandstone. There is a quantity of rhenoster bush in the vicinity of the local accommodation house, and here a sample of soil, No. 7, very light in colour, was collected from a hill top. About a mile and a half lower down in the valley a sample of "vlei" ground, No. 8, was collected on the farm Ganze Vallei. Here and there large patches of conglomerate show through the soil and along the hillsides. Another sample of vlei ground, No. 12, looser and much darker than the last, and an all-round better soil, was taken on the farm Matjesfontein, just after crossing the Keurbooms River, four miles from Ganze Vallei. The organic matter—which, moreover, contains a good deal of nitrogen—in this sample is higher than in any previously collected in this Division. The soil is well supplied with lime, and has a satisfactory store of potash and phosphoric oxide. Further east on this farm Matjesfontein, the soil becomes lighter in colour and sandier, and the vlei ground is to a large extent intermingled with blown sand from the sand dunes along the coast. Of one of these mixed soils a sample, No. 13, was taken, a mile intervening between this and the previous sample: another sample—to outward seeming of the same class—No. 11, was collected on the farm Witte Drift, about five miles west of No. 13. On all these vlei grounds general cultivation is carried on, with fair success, over a large area. At Witte Drift the rhenoster bush is again met with, growing on a rather stiff brown clay soil: of this a sample, No. 10, was obtained. All these latter soils yielded noticeably lower results by analysis than No. 12. After traversing a distance of four miles and rejoining the main road, a sample, No. 9, was taken from a plateau covered with reeds and extending westwards for miles, up to the borders of the forest. The soil here is almost all-through deficient.

Below Millwood a sample of black loamy soil was collected, No. 3 in the list. This class of soil extends southwards right down to the forest, where it gives place to more clayey soil of a lighter nature. Of this latter, a sample, No. 4, was taken in the forest on the way from Millwood to Balmoral, at a distance of 2½ miles from the point where No. 3 was taken. Neither of these two soils is chemically well provided.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
14.	Zwart River.	Sidgefield.	J. Grant.
15.	„	Lot B (2).	A. Bibbey.
16.	„	Salisbury.	P. Bornemisza.
17.	Gouwkamma.	Belvidere.	A. V. Duthie.
18.	Knysna.	Bracken Hill.	P. Bornemisza.
19.	Keurbooms River.	Matjesfontein.	„

Sample No. 14 was collected on the farm Sidgefield, at Groen Vallei. Nos. 16, 18, and 19 were taken on the farms Salisbury, Bracken Hill (Lot R.R.), and Matjesfontein, respectively, from lands intended to be utilised for tobacco cultivation. The farm Salisbury adjoins Olyvenhout, or Hollywood, on the boundary of the George Division. North-west of Hollywood, and nearer the George boundary, a sample of soil, No. 15, was collected from Lot B (2).

The analytical results obtained from the soils of this Division are comprised in the following tables:—

(*Method I.*)

No.	Percent. of Field Sample. Fine earth.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through ½ mm. Sieve. Lime.	Potash.	Phosphoric oxide.
1.	96·0	1·17	6·55	·0237	·203	·032	·012	·020
2.	98·5	·86	4·19	·1068	·161	·044	·011	·013
3.	96·6	1·59	8·86	·0672	·287	·074	·017	·031
4.	95·6	3·84	12·21	·0813	·413	·032	·028	·056
5.	94·7	·97	5·01	·0163	·154	·050	·014	·018
6.	98·2	1·27	5·81	·0347	·196	·028	·014	·046
7.	97·0	·66	2·80	·0262	·105	·028	·023	·010
8.	99·5	2·19	6·31	·0707	·231	·116	·054	·045
9.	98·0	1·20	5·39	·0651	·126	·082	·030	·018
10.	90·8	1·60	6·42	·0198	·175	·112	·069	·044
11.	82·9	·98	4·19	·0113	·154	·052	·040	·044
12.	97·1	3·05	11·92	·0453	·399	·544	·105	·110
13.	84·4	1·33	5·16	·0130	·161	·112	·039	·078
14.	96·4	·56	1·71	·0297	·067	·090	·050	·051
15.	95·8	3·28	11·25	·0117	·462	·040	·029	·012
17.	96·8	1·25	4·41	·214	·140	·098	·036	·0051

(*Method II.*)

No.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through 3 mm. Sieve. Lime.	Potash.	Phosphoric oxide.
16.	1·54	4·79	·023	—	·65	·13	·13
18.	1·00	4·10	·001	—	·36	·09	trace.
19.	·76	14·14	·010	—	·75	trace.	·06

Of the soils, Nos. 7 to 13, collected around the mouth of the Keurbooms River, it will be noticed that there is a considerable difference, in the amount of available plant food, between Nos. 8, 10, 12, and 13, on the one hand, and Nos. 7, 9, and 11, on the other. The former are all either wholly or very largely made up of the alluvial deposits which surround the river mouth; of the latter, Nos. 7 and 9 were taken from the all-prevailing sandstone formation, and No. 11 from the Enon deposits which flank the alluvium, and with which No. 13 is also probably to a certain extent diluted. The following are the averages of each of these two sets of soils:—

	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
Nos. 8, 10, 12, and 13.	·242	·221	·067	·069
Nos. 7, 9, and 11	·128	·054	·031	·024

The poverty in available plant food constituents, noticed with respect to the southern portion of the George Division, extends, with some reservations, however, into the adjoining Division of Knysna. Here we find on an average even less potash and phosphoric oxide, but the lime shows a slight increase. There is a sufficiency of nitrogen all through, but the inorganic requirements of the soil are lacking in the Zwart River and Gouwkamma Field-Cornetcies. Potash, in fact, may be said to be lacking throughout the Division, with the exception of a limited area round the mouth of the Keurbooms River. Near Plettenberg Bay there is an improvement visible on the farms Ganze Vallei and Witte Drift. Of the two samples collected on the latter farm it will be observed that No. 10 is noticeably the better. The richness of the forest soils near Millwood in nitrogenous material, and organic matter generally, is worth noting, and special attention has already been directed to the quality of the alluvial soil No. 12 from the farm Matjesfontein near the Keurbooms River mouth. There is no doubt that these alluvial, or, as they are locally termed, "vlei" soils, are better supplied with plant nutriment than the average soils of the Division.

KOMGHA.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	No. 3.	Prospect.	St. C. O. Sinclair.
2.	,,	,,	,,
3.	,,	Ferndale.	,,
4.	,,	,,	,,
5.	,,	Reedfontein.	,,
6.	,,	,,	,,
7.	,,	,,	,,
8.	,,	Hopewell.	,,
9.	,,	Stainland.	,,
10.	,,	,,	,,
11.	,,	,,	,,
12.	,,	,,	,,
13.	,,	Zuurvlakte.	,,
14.	,,	,,	,,
15.	No. 1.	A. D. Campbell.	,,
16.	,,	Residency.	,,
17.	No. 2.	Ben Hall.	,,
18.	No. 6.	Lilyvale.	,,
19.	,,	,,	,,
20.	,,	Westbury.	,,
21.	,,	E. Sanson.	,,
22.	,,	Fort Warden.	,,
23.	,,	Beaconsfield.	,,
24.	,,	Badnoch.	,,
25.	,,	,,	,,
26.	,,	Jessie.	,,
27.	No. 5.	Sea View.	,,

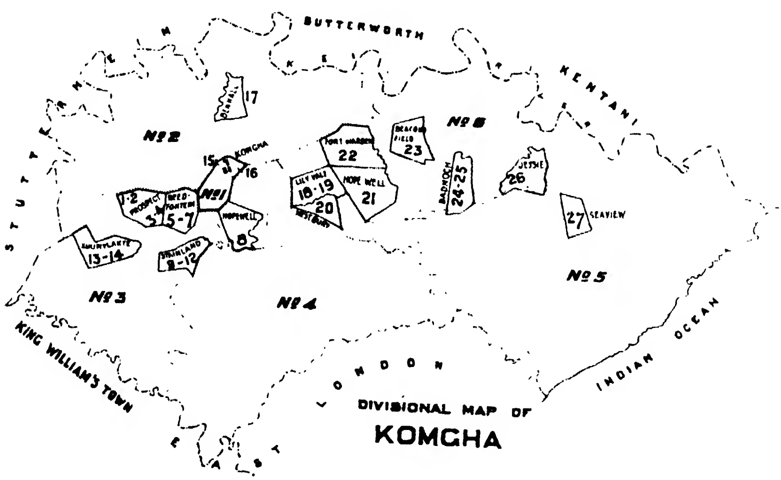
In taking samples in the Komgha Division, it became necessary, for the reasons mentioned in connection with the Cathcart Division, to place one's self largely in the hands of the local agriculturists in respect to the selection of localities from which to take samples. In a few cases samples were taken for special reasons: for instance, where experiments in fruit growing were being carried on, and where it was the intention of the

occupier to use his land for specific crops, and it was consequently desirable to have the most reliable information as to the exact physical and chemical nature of the soil in use.

The soil of the Komgha Division is essentially derived from the peculiar "Lower Karroo" sandstone (Ecca beds, or, as the Geological Commission has now termed them, in that part of the Colony,* Umsikaba beds). Dolerite, occurring either in sheets, dykes, or loose boulders, is exceedingly plentiful, and one cannot go anywhere in the district without finding it in evidence in one or other of these forms.

The surface soil, on the whole, appears distinctly loamy, consisting of clay with a very fair proportion of fine sand. In some cases, however, the soil seemed more sandy. The subsoil is generally either a red gravel, or a rather stiff yellow pot clay, although, of course, variations between the two are not rare.

In judging of the latent fertility of the soil of any portion, the prevailing physical conditions, such as the nature and divisibility of the surface and subsoil, the situation and slope of the land, the exposure to prevailing winds, thunderstorms, and rains, always important factors, should



DIVISIONAL MAP OF
KOMGHA

be even more largely taken into account in the case of this division than is usually done. From a chemical point of view, external evidence leads one to expect a soil rich, on the whole, in the essential mineral plant foods, lime, potash, and phosphoric oxide, the last named, perhaps, not quite so plentiful in proportion as the other two.

In some cases the clayey nature of the soil makes draining desirable. Where this has been done, excellent results have been reported. Very little manuring is carried on, due to the scarcity of manure. A start has, however, been made with artificial fertilisers. Fruit trees, such as pears and plums, especially Japanese plum and orange, seem to thrive, and near the coast bananas do well. Wheat does not grow satisfactorily, although at one time its cultivation was profitable. On the other hand, the lands stand maize well. A very possible explanation of this may be the fact that wheat is sown on lands which have borne crops of this cereal for a considerable time in the past, and consequently have undergone great loss

* Geological Commission Annual Report 1902, pp. 9 a d 14.

of phosphatic material.* But maize, taking out of the soil a larger amount of lime in proportion than wheat, is able to flourish where wheat does but poorly.

Sample No. 1 was collected on the farm Prospect; it represents a dark hillside soil, with a red gravelly subsoil. No. 2 was also collected on this farm. Fruit growing is very successfully carried on here. Nos. 3 and 4 are types of black soils from the adjoining farm Ferndale. Around the locality whence the samples were taken, doleritic boulders were noticed. Nos. 5, 6, and 7 were collected on the farm Reedfontein. Of these, No. 5, a soil of good depth, was stated to yield poor results when sown with oats. No. 6, on the other hand, which contains nearly double the proportion of phosphoric oxide, and three times the quantity of potash, gave good results with the same crop—another instance of practical experience bearing out the results of chemical analysis. No. 7, lying on a subsoil of yellow clay, was reported to be very poor. The subsoil, which comes to within a short distance of the surface, was noticed to be very damp at the time of sampling. This is, no doubt, one factor which may account for the poor productiveness of the surface soil. No. 8 represents the red soil of the farm Hopewell. The land represented was intended to be used as an orchard. Nos. 24 and 25 were taken at Badnoch, and No. 27 is a sample of black and somewhat sandy soil found on the farm Sea View. No. 26 was taken a short distance from the roadside at Jessie. No. 20 is from Westbury, taken from the top of one of the hillocks near the homestead. No. 21 was collected on the farm of Mr. E. Sanson.

Samples 9, 10, 11, and 12 were taken at Stainland, the farm of Mr. Coulter. No. 9 represents a valley soil from a patch which was at one time a swamp, but had, by draining, been turned into an area where oats do well. It is very similar to No. 10, which differs from it in being more sandy. No. 11 is a red soil taken in the vicinity of some doleritic boulders. No. 12 is a valley soil which should prove valuable.

Nos. 13 and 14 were collected from Mr. Van Rensburg's farm Zuurvlakte. No. 15 was taken from a plot owned by Mr. A. D. Campbell, adjoining the commonage, and would be typical of the soil of a large portion of the latter. No. 18, from the farm Lilyvale, was taken from a patch studded with mimosa trees. No. 19 is from the same farm, and was taken underneath a mimosa tree. No. 17 was collected on the farm of Mr Ben Hall. It represents the soil of the hill side sloping towards the Kei River. The surrounding soil was very shallow.

The results obtained by analysis are tabulated below:—

(Method I.)

No.	Percent. of Field Sample. Fine earth.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through ½ mm. Sieve. Lime.	Potash.	Phosphoric oxide.
1.	97·5	3·95	12·53	·0230	·252	·222	·042	·056
2.	92·9	2·47	6·80	·0329	·196	·134	·016	·014
3.	98·4	5·05	14·79	·0463	·252	·310	·124	·028
4.	95·8	4·47	12·01	·0275	·280	·490	·026	·036
5.	94·4	3·24	8·62	·0240	·168	·122	·025	·019
6.	97·2	1·84	5·84	·0110	·154	·106	·076	·032
7.	98·9	1·87	5·72	·0190	·154	·068	·116	·020
8.	98·1	2·84	9·45	·0162	·189	·122	·146	·020

* See remarks on this subject on pp. 334, 335, and 475.

(Method 1)—(continued).

No.	Percent. of Field. Sample. Fine earth.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through ½ mm. Sieve. Lime.	Potash.	Phosphoric oxide.
9.	98·8	2·94	6·56	·0311	·182	·322	·017	·0089
10.	98·5	1·44	3·43	·0113	·126	·092	·014	·0064
11.	97·7	3·83	11·08	·0445	·217	·042	·045	·051
12.	96·8	2·17	7·50	·0339	·224	·098	·235	·032
13.	98·2	1·60	4·78	·0204	·147	·070	·060	·032
14.	94·6	1·83	6·09	·0544	·175	·078	·154	·031
15.	87·6	1·33	4·36	·0148	·147	·100	·042	·036
16.	92·9	2·36	6·89	·0050	·175	·064	·050	·037
17.	99·3	1·05	3·63	·0106	·133	·044	·063	·023
18.	98·1	1·24	4·41	·0035	·147	·068	·035	·030
19.	95·2	2·13	7·43	·0099	·273	·162	·046	·050
20.	97·1	1·25	4·17	·0311	·091	·032	·030	·015
21.	99·2	1·27	4·11	·0057	·133	·050	·033	·019
22.	98·8	·69	2·34	·0042	·098	·012	·023	·012
23.	98·4	4·19	13·34	·0057	·273	·062	·095	·067
24.	98·9	·97	3·62	·0183	·112	·056	·030	·0064
25.	97·4	4·50	14·63	·0057	·231	·120	·048	·013
26.	99·8	6·30	15·18	·0120	·245	·294	·019	·029
27.	98·5	1·49	6·10	·0290	·147	·072	·044	·0064

The proportions of lime and potash in the soils of the Komgha Division are, taken all round, fairly satisfactory, but phosphates are decidedly lacking: in this respect there is a strong resemblance to the adjoining division of Cathcart.

Of the soils in the above list, the three taken from Field-cornetcies Nos. 1 and 2 are all deficient in lime and phosphoric oxide: samples 15 and 16 are likewise deficient in potash, while No. 17 is not much better in this respect. The samples from Field-cornetcies Nos. 5 and 6 average poor results all round. Speaking generally, Field-cornetcy No. 3 is the best off with regard to lime and potash, but here too phosphatic material is lacking. To come to details; Nos. 10, 24, and 27 are poor in all of the three inorganic fertilising constituents, and phosphoric oxide, in particular, is almost entirely absent. Nos. 13, 18, 20, 21 and 22, although containing a little more phosphoric oxide, are nevertheless poor all round. No. 9 is also characterised by an almost entire absence of phosphoric oxide.

To summarise, eight, out of the 27 Komgha soils, are deficient in all of the three principal classes of inorganic plant food; seven others lack both phosphoric oxide and potash, namely: Nos. 2, 4, 5, 9, 15, 25, and 26: Nos. 7, 12, 14, 16, and 17 are poor in phosphoric oxide and lime. Three samples, *i.e.*, Nos. 3, 6, and 8, are poor in phosphoric oxide only, No. 11 is greatly in need of both lime and potash, Nos. 1 and 19 require potash, and No. 23 lime. Thus it happens that there is not a single soil, of all those taken, regarding which it can be said that it is well—or even fairly—supplied with all plant food constituents in an available condition.

It will be noticed that these soils are all of a clayey nature, and they appear to contain, generally, a larger amount of chlorides than has been found by analysis in the Western Province soils.

LADISMITH.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Anysberg.	Papenkuilsfontein.	J. Muller.
2.	,,	,,	,,
3.	Groot River.	Buffelsfontein.	,,
4.	,,	,,	,,
5.	,,	Zeekoegatsdrift.	,,
6.	,,	Buffels Kloof.	,,
7.	,,	Buffels Drift.	,,
8.	Ladismith.	Elands Vallei.	,,
9.	Huis River.	Hoeko.	,,
10.	,,	Weltevreden.	,,
11.	,,	Zoar.	,,
12.	,,	Amalienstein.	,,
13.	,,	,,	,,
14.	,,	,,	,,
15.	,,	Opzoek.	,,
16.	Buffelsfontein.	Buffelsfontein.	,,

The first sample taken in this Division was No. 1, a rather poor, sandy soil, from lands on the slope of the hill south of De Erf, or Papenkuilsfontein. On the same farm No 2 was taken, a dark alluvial soil, of greater productiveness than the previous one, and collected from the garden near the house. Both samples proved rather poor in phosphates, and No. 1 in lime as well: they also show signs of being brack, especially No. 2. A very barren belt of country stretches between the Prins and Buffels Rivers, and resembles the Gouph in every respect: flanked on the north by the Klein Zwartberg Range, and on the south by the Touwsberg Mountains, both of which ranges consist of Table Mountain sandstone, its barrenness is not to be wondered at. At Buffelsfontein the bed of the river widens out considerably, on entering a broad valley which is literally dotted with farms. Two samples were selected here:—No. 3, a sandy soil taken from a vineyard on the farm of Mr. J. J. van Zyl, and said to be very fertile, and richer than No. 4. The latter was a loose clay, taken from Mr. J. Wolfaardts farm, and supposed to be as rich as the soil collected along the Touws River*; analysis, however, shows that there is not a superabundance of mineral plant food.

Passing through the farm Voorbaat, the river course was followed to the farm Zeekoegats Drift, and here sample No. 5 was selected from soil adjoining the vineyard. Good results have been obtained from sweet potatoes and other root corps on the particular soil represented by this sample: it is adequately furnished with potash and lime, a fact which will account for this. At Buffels Drift a loose, sandy clay, No. 7, was sampled, representing the bulk of the lands in the valley on either side of the Zwartbergs River. Then following the main road to Ladismith, these samples were collected: No. 6, taken from lands on the right bank of the Buffels Kloof River, on the farm Buffels Kloof. The soil here very closely resembles a red Karroo soil: although not equal to such a Karroo soil in fertility, it is said to yield much better results than No. 8. There are several large patches of this soil under cultivation. No. 8 represents a stiff clay, rather shallow, from the farm Elands Vallei. It is considered to be poorer than

* See remarks later on, regarding the collection of sample from Zevenfontein, No. 1 from the Swellendam Division.

No. 6, and this supposition is borne out by chemical analysis The amount of lime is extremely low.

In the Field-Cornetcy of Huis River, No. 9, a rather loose, gravelly clay was taken from uncultivated parts in lucerne camps on the farm Hoeko, belonging to Mr. W. van der Merwe. Mr. Van der Merwe's cattle graze on the heights above the Touws River; manure, consequently, is rather difficult to procure on the farm, and costs too much to transport. The soil, however, is fairly rich in plant food. No. 10, a fine, sandy, alluvial soil, was taken, on the farm Weltevreden, from the gardens in the valley, and is locally considered poorer than No. 9, which was collected from camps along the hill slopes: the analysis certainly does bear out that opinion. No. 11, a red sandy soil, was taken from the garden plots of the Rev. Mr. Kretzen, at Zoar, the Mission Station.

At Amalienstein three samples were collected: No. 12, a rather sandy soil, was taken from lands near the main road, on the way from Zoar to Amalienstein. No. 13, a fairly stiff red clayey soil, was taken from the garden of the Rev. C. Prozesky. No. 14 represented a loose, somewhat sandy clay, from lands to the left of the road from Amalienstein to Calitzdorp. The crops, which were just being harvested, were exceptionally poor, the result principally of very servere drought and scarcity of kraal manure. At the farm Opzoek No. 15 was sampled—a rather stiff, clay soil, said to be very good from the farmer's standpoint. It contains a good quantity of lime and potash, and a fair supply of phosphates.

Buffelsfontein was the next place visited—more of a village than a farm—situated on the left bank of the Groot River, south-east of Ladismith. The soil along the river-bed is similar to that at Buffels Vallei, higher up on the Buffels River, and consequently no sample was taken here. On the heights above are several gardens, in a loose, sandy clay, of which No. 16 is a typical sample, collected from the garden of Mr. J. T. van Wyk. This soil is not considered to be as rich as that in the valley below.

A map of the Ladismith Division will appear in the December number of this Journal.

The following table shows the results of the chemical analyses of the soils above described:—

(Method I.)

No.	Percent. of Field Sample. Fine earth.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through ½ mm. Sieve. Lime.	Potash.	Phosphoric oxide.
1.	60·5	·64	2·36	·0297	·043	·056	·136	·042
2	90·8	1·84	5·55	·1825	·112	·138	·110	·056
3.	65·0	·93	4·04	·0134	·126	·332	·166	·106
4.	71·4	·73	3·12	·0156	·070	·128	·052	·059
5.	97·5	·92	4·39	·0775	·098	·344	·187	·097
6.	56·3	1·54	7·08	·0134	·203	·102	·166	·104
7.	79·6	·95	3·72	·0255	·098	·102	·166	·077
8.	85·3	·93	4·08	·0095	·105	·036	·071	·068
9.	45·5	1·36	7·65	·0071	·203	·138	·196	·160
10.	81·0	·85	3·86	·0332	·126	·094	·133	·091
11.	67·1	1·04	4·49	·0318	·133	·256	·307	·147
12.	56·7	·61	4·06	·0042	·057	·088	·266	·099
13.	74·5	1·42	4·32	·0138	·084	·470	·260	·095
14.	77·3	1·07	3·52	·0966	·057	·148	·183	·052
15.	86·0	4·04	6·94	·0081	·161	·522	·314	·069
16.	86·8	1·66	4·97	·0219	·126	·150	·274	·073

Allusion has been made above to certain of the soils of this Division which resemble those of the vast stretch further inland, known as the Karroo. So great, in fact, is this resemblance, that a portion of this Division, and that of Oudtshoorn adjoining thereto, is often called the "Ladismith and Oudtshoorn Karroo." The soil of a great part of this area consists of the disintegrated Bokkeveld beds which overlie the sandstone formation referred to in connection with the soils of the George Division. These Bokkeveld beds consist not merely of sandstone, but also of siliceous clay slates, and thus, in decomposing, they give rise to a sandy loam, superior, for agricultural purposes, to the sands, for instance, of the George Division. This "Oudtshoorn and Ladismith Karroo" covers the stretch of country which extends eastwards between the Zwartberg and Langeberg Ranges and their continuations. This belt of country has a great reputation for fertility, especially in the Oudtshoorn Division, east of Ladismith; the cause of this is easily explained: there stretches throughout this belt a surface formation of calcareous marl, derived from a thin stratum of limestone called by local farmers "Kalkbank." Its fertilising effect is noticeable solely in the valleys, and further east, in the Oudtshoorn Division, it is one of the principal factors in the almost unexampled fertility of the Grobbelaars and Wynands River Valleys, the Cango district, and the region about Vlakte Plaats.

Maclear.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Wizard's Vale.	Thomson.	P. W. Leach.

A sample of soil was collected on the farm Thomson, at the junction of the Tsitsa and Mooi Rivers, from a spot where tobacco was being cultivated The quality of the tobacco produced had been very highly commended by the Government Tobacco Expert. The soil is, taken all round, of good quality. Good tobacco had also been grown on the farms Gordon and Wizard's Vale, in the same district.

The following is the analysis of the above soil:—

(Method II.)

	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through 3 mm. Sieve.		
No.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	1·75	9·18	·011	—	·87	·38	·19

Mafeking.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	No. 1.	Hartebeestlaagte.	S. Minchin.
2.	No. 2.	West Hill.	M W. B. Webb.

No. 1 was a sample of sandy soil, collected from the farm Hartebeestlaagte, which adjoins the railway line. It was intended to plant several hundreds of fruit and ornamental trees on this soil. The sample was taken about two feet below the surface, and was stated to overlie a granite formation. This formation is, in fact, exposed along the river beds of the Molopo and Maratsani.

No. 2 was taken, at a point 25 miles north-east of Maribogo Railway Station, from lands which it had been proposed to bring under irrigation and utilise for the growing of lucerne.

According to the following analytical figures, both the above soils are very poor in all plant food:—

(Method 1.)

	Percent of Field	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through ½ mm. Sieve.		
No.	Fine earth.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1	75·2	1·78	4·53	·0007	·042	·036	·048	·056
2	78·5	·93	2·99	·0025	·056	·064	·056	·041

These poor soils may be considered as representative of the large area of surface sands and quartzites that stretches westwards from Mafeking for very many miles.

(To be continued.)

THE WORKING VALUE OF THE WIND AT KIMBERLEY.

By J. R. Sutton, M.A., Sc.D.

Mr. Kanthack has called attention once or twice lately to the regrettable paucity of data in South Africa as to the variation of wind velocity from hour to hour and from day to day. He makes it plain that what is wanted is a definite statement of the working value of the wind to the user of a windmill. Particulars of average velocities are obviously insufficient. With the object of supplying some part, at any rate, of the required information, I have analysed my anemometer records for the three years 1905-7, arranging the results in sequences of velocity, *i.e.*, the number of hours of wind in each quarter of the year for velocities 0 to 1, 1 to 2, 2 to 3, ... miles per hour. These are also shown here for the four separate six-hourly periods of the day. The results reduce down to a very small compass, but the amount of work required to produce them has been very great; so much so that only a most pressing need for such information would justify anyone in undertaking it.

As an example of the use of the Table at the end, let us consider wind velocities of 4 to 5 miles an hour for the quarter December to February. Here, in three years, there were 167 hours of such wind between midnight and 6 a.m.; 160 hours between 6 a.m. and noon; 183 hours between noon and 6 p.m.; and 169 hours between 6 p.m. and midnight. Again, for the same velocities, for the whole three years, there were 653 hours, 711 hours, 697 hours, and 758 hours, for the four respective quarters of the day, or a total of 2,818 hours altogether in three years. By taking totals from the last column we see that there were 10,924 hours of wind in the three years (say 3,641 hours per annum) of a greater velocity than 5 miles an hour, and 15,322 hours (say 5,107 hours per annum) of a less velocity.* This result perhaps shows the Kimberley wind to be more useful than an inspection of the mere monthly averages would suggest.

A curious result is that either the wind itself, or the anemometer, displays a decided preference for certain velocities at the expense of others. Thus a wind of 7—8 miles per hour is commoner than one of 6—7 miles per hour. This effect is shown most plainly in the summer and in the forenoon. It is not found to the same degree during the winter, nor during the night, probably because the wind seldom exceeds five miles an hour between sunset and sunrise. It is curious though that in March the preference changes somewhat, velocities of 6—7 miles an hour being more frequent than velocities of either 5—6 or 7—8 miles an hour. In this connection it is worth notice that the favourite velocities occur at intervals of 5 miles an hour, *i.e.*, velocities 2—3, 7—8, 12—13, 17—18, are respectively more frequent than the contiguous velocities on each side. I am investigating this point further. It is rather a scientific than a practical point, however.

* In consequence of an accident 36 hours were lost from the record.

TABLE SHOWING THE FREQUENCY OF WINDS OF GIVEN VELOCITIES.

Miles per hour.	Midnight at 6 a.m.					6 a.m. to Noon.					Noon to 6 p.m.					6 p.m. to Midnight.					Whole Day.
	Dec. to Feb.	Mar. to May.	June to Aug.	Sept. to Nov.	Three Years.	Dec. to Feb.	Mar. to May	June to Aug.	Sept. to Nov.	Three Years.	Dec. to Feb.	Mar. to May.	June to Aug.	Sept. to Nov.	Three Years	Dec. to Feb.	Mar. to May.	June to Aug.	Sept. to Nov.	Three Years.	Three Years.
0 to 1 ...	299	444	456	291	1,490	63	185	226	76	550	32	135	140	34	341	227	304	219	182	932	3,313
1 „ 2 ...	229	304	308	220	1,061	85	187	196	82	550	50	126	142	45	363	201	294	229	138	862	2,836
2 „ 3 ...	212	270	283	227	992	138	189	247	132	706	132	170	226	80	608	195	281	337	198	1,011	3,317
3 „ 4 ...	202	160	214	209	785	168	190	197	146	701	154	192	182	138	666	162	220	299	205	886	3,038
4 „ 5 ...	167	150	149	187	653	160	219	186	146	711	183	196	176	141	697	169	162	220	207	758	2,818
5 „ 6 ...	144	94	107	159	504	205	178	164	192	739	200	181	204	192	777	175	144	164	184	667	2,687
6 „ 7 ...	92	67	44	108	311	140	111	102	108	461	138	161	114	148	561	96	75	85	113	369	1,702
7 „ 8 ...	95	60	39	92	286	188	134	116	158	596	184	136	121	152	593	110	71	58	118	357	1,832
8 „ 9 ...	47	38	25	42	152	138	72	71	120	401	133	85	84	124	426	77	47	15	86	225	1,204
9 „ 10 ...	41	30	11	32	114	103	60	41	119	323	107	64	56	108	335	44	15	7	65	131	903
10 „ 11 ...	34	17	12	24	87	74	62	49	136	321	100	72	62	108	342	54	18	10	42	124	874
11 „ 12 ...	20	6	3	10	39	45	16	25	64	150	49	34	44	62	189	23	7	6	24	60	438
12 „ 13 ...	15	7	3	18	43	48	20	21	57	146	57	34	45	85	221	33	10	3	27	73	483
13 „ 14 ...	6	...	...	9	15	15	12	7	32	66	25	13	18	47	103	13	3	1	15	32	216
14 „ 15 ...	8	...	1	4	13	15	11	2	33	61	21	13	16	50	100	8	1	...	7	16	190
15 „ 16 ...	2	2	...	2	6	9	5	4	20	38	18	14	7	46	85	10	2	1	8	21	150
16 „ 17 ...	...	1	...	...	1	5	2	1	4	12	3	9	2	15	29	1	1	...	2	4	46
17 „ 18 ...	...	...	1	2	3	8	3	1	6	18	13	7	7	36	63	4	2	...	9	15	99
18 „ 19 ...	...	...	...	1	1	2	1	...	3	6	3	5	1	8	17	1	...	...	...	1	25
19 „ 20 ...	...	...	...	...	...	...	...	...	2	2	4	4	1	7	16	2	...	...	5	7	25
20 and over ...	...	...	...	1	1	5	...	...	2	7	10	5	2	12	29	9	1	...	3	13	50

MAIZE STALK BORER.

(Sesamia fusca.)

MAIZE FODDER AS A PREVENTIVE.

By C. W. Mally, M.Sc., F.E.S., Eastern Province Entomologist.

In harmony with the resolution passed by the Conference in Pretoria, January 7th and 8th, 1908, to discuss the exportation of maize, the term "Maize" is used in place of Mealies in this discussion. And in harmony the term *Maize Fodder* is used for a crop of maize which is cut for the purpose of preserving the cobs as grain and the stalks and the leaves as stock food. The term *Maize Stover* is used for fodder from which the cobs have been removed. I also beg leave to suggest that the term *Maize Hay* be used for a crop of maize grown and cut especially for hay.

Life History of the Maize Stalk Borer.

In the *Agricultural Journal* for August, 1905 (Vol. XXVII, pp.159-168), a brief account was given of the life history of the insect under consideration. The full details need not be repeated in this connection, and it is therefore only necessary to call attention to the fact that the winter stage of the insect, which is passed as a larva, or "borer," within the stalks of maize and also Kafir corn and other sorghums, is the weak point in its life history. It has been claimed that the moths emerge in June and pass the winter as adults, and that it is therefore useless to try to control the pest by winter treatment. This claim is founded on the fact that empty pupa cases are sometimes found in the stalks at that time. But these empty cases undoubtedly belong to the moths which deposited the eggs for the over-wintering larvae. All records of the emergence of the moths show that they emerge in the spring. If any emerge in June they must be regarded as exceptional variations.

The question of how to use the crop so as to dispose of the stalks which are usually left in the field over winter is, therefore, of practical importance, for, by so doing, we destroy the pest for the coming season

Initial Work.

To demonstrate whether or not the destruction of the over-wintering maize stalks would effectually dispose of the stalk borer, the stalks were destroyed on a number of adjoining farms during August, 1904. The results satisfied the writer that the over-wintered stalks were essential to the survival of the pest. The work was duplicated the following season, but not under the same stringent conditions as the first, to show whether or not satisfactory results could be obtained without such exacting care as to

details. The records by myself and Mr. W. R. Dewar, late Eastern Province Entomologist, show that the young plants were almost entirely free, but that towards the close of the season the borers were again on the increase. *The important point to be remembered is that the protection of the crop in its early stages ensures a full stand of plants, and hence a full crop at the end of the season*, so far as the borer is concerned, for, in my opinion, the damage caused by it during the latter part of the season may be disregarded from the practical standpoint. The object is to *control* the pest by preventive means, so that serious loss will not be sustained; but some seem to be under the impression that complete annihilation of the pest is aimed at. But in this connection we must bear in mind that this insect is native to the country, and that, in all probability, Kafir corn and other varieties of sorghum, which, so far as can be determined, are also native to Africa, were its favourite food plants under original conditions, and that the insect simply followed the progress of the plant under cultivation, and in course of time adapted itself to maize. Careful search has been made for other food plants, but so far none but those indicated above have been found. The fact that the winter is passed in the stalk also makes it easy to see how the insect could be disseminated by the natives using the stalks to thatch their huts

As pointed out in the beginning of the work, the objection to burning the stalks is the fact that by so doing a considerable amount of vegetable matter is lost to the soil. It is also true that leaving the stalks to stand in the field is bad practice, for the more important reason that we thereby, in a large measure, allow an important supply of stock food to go to waste.

Having shown that the winter stage is the critical time in the life history of the pest, and, furthermore, that it is dependent on the overwintering stalks, the next step is to determine preventive measures, or combinations of them, which will enable us to attain the desired end with the least extra labour and expense and with the greatest advantage from the standpoint of profit, considering the crop as a whole.

Maize Fodder.

The practice in other countries of cutting the maize crop just as it begins to ripen—*i.e.*, when a few of the lower leaves are dry and the majority of the cobs hardening and showing the glazing and the dent in the kernel—makes it possible to handle the entire crop to good advantage, and at the same time leave little or no refuse material on the land to harbour pests. Although maize has been cut for fodder in some places for many years, any effort to extend the practice to new sections or countries has had to overcome the fear that besides losing the cobs as a grain crop, the maize, in place of curing to good advantage, would spoil in the stook. The same objection was raised at different times in this Colony when it was suggested that the crop should be cut for fodder and fed to stock in preference to burning the stalks as a preventive measure for the stalk borer. It was, therefore, decided to cut a field of maize for fodder as a means of demonstrating the points to be observed from the standpoint of destroying the borer as well as removing any doubts as to the proper maturity of the cobs or the curing of the fodder.

Mr. V. R. Smailes, at Trappes Valley, had a field of maize that offered a good opportunity for a test, and he kindly consented to co-operate in the work. On May 28th a part of the field was divided into lands, and every alternate one cut for fodder and stook in accordance with the method known to give perfect satisfaction in other countries, especially the United States and Canada. The uncut lands were left to ripen in the ordinary way.

Cutting the Maize.

In this connection a few points of practical importance should be mentioned. The sickle is usually used for work of this kind in this country, but if close supervision is not given, the boys are apt to cut the stalks rather high, thereby increasing the likelihood of leaving some of the borers that are in the lower part of the stalk. Mr. Smailes also pointed out that the long stumps would also be a source of worry to the oxen in ploughing. The stalks should, therefore, be cut as close to the ground as practicable, not only when the crop is cut by hand, but when it is cut by means of a "maize harvester" as well.

In making a careful examination of the stumps for borers, an ordinary chopper was used, and it proved to be so convenient that I tried it for cutting the stalks as well, and found it better than the sickle, because the stalks could be cut very close to the ground without special effort, and the work was easier, and could be performed in less time, thus saving labour and at the same time reducing to the minimum the chance of borers being left in the stumps. Although the borers may be found in any part of the stalk, including the cob, they are not, as a rule, in the portion of the stalk below the surface of the ground. Cutting the stalks so close to the ground increases the chances that the borers, especially the least mature of them, will perish on account of the weathering of the stump. The stumps will also be easier to plough under properly, thus again increasing the chances for the destruction of any borers that may be left behind.

The Stook.

The stook, which should be kept in line at least one way, in each case contained the cut maize from a space about ten yards square. Two or three stalks standing near the centre of the square were fastened at the top by twisting them or by tying them by means of a tuft of grass or ordinary binding twine. The maize was then stood up evenly around them as a centre, allowing them to slope just enough to stand together nicely. When complete the stook was tied fairly tight about shoulder height from the ground with long grass or river-rushes, which had been twisted or knotted together. Twine such as is used in reaping forage serves admirably, and was used in the test at Mr. Herbert Wallace's, mentioned later on. With a little experience the stooks can be put up quickly and substantially, and when tied in the manner just described they will withstand wind and rough weather very nicely, and at the same time allow the air to circulate sufficiently for the proper curing of the fodder. Being secured at the top, very little rain can enter them, it being shed by the outer layer of stalks; and the little that does enter soon dries out in the ordinary course. The aim is to make a medium-sized-stook, so that less of the fodder will be exposed to the weather. If the stooks are made too large there might be a tendency to mould.

In the great maize section of the United States the stalks are not secured at the top; but the maize grows much heavier there than it does, as a rule, in the Eastern Province, and hence forms a more substantial stook when piled. By experience with large quantities the men become expert in quickly forming a stook evenly and firmly so that it will stand against wind and rain. But in sections of this country where maize stalks do not grow as heavy as in America, it is best to take the precaution of tying them at the top as a protection against the wind, as well as the bad stooking liable to result from the inexperience of native labour. If the stooks are badly set up, that is, too loosely or by the stalks being placed irregularly so that one side of the stook is heavier than the other, or by the stalks sloping too much or sloping on one side more than the other, the heavier parts will slip to the side, and in so doing remove the support

for the stalks on the one side and push those on the other. They tend to fall somewhat spirally around the central portion, with the tops pointing outward, and if they drop to the ground they are likely to decay, and will, at least, be greatly deteriorated by weathering.

The fact that the stalks are apt to be very short, three to five feet, during a dry season in this country does not necessitate a different type of stook, because the longer stalks will hold the shorter ones in place. Some short stunted maize which was cut and stooked in the way described in order to show the wintering of the borers in the fodder, cured perfectly. There may be somewhat more weathering in the case of stunted fodder, but from the practical standpoint this may be disregarded. In America the stumps left by the "corn knives" ordinarily used are longer than is desirable in this country on account of the borer. As will be explained later, the stalks should here be cut as low as is practicable.

Removing the Fodder.

In many parts of America the stooks are left in the field throughout the rainy autumn weather, and only brought in as needed during the winter. But in this mild climate, and in view of the succession of crops which can be carried, it is advisable to remove them from the field as soon as the cobs and the fodder are dry enough to be stored. In the present instance the stooks were left till June 2nd, and when they were opened they were found to be in good condition in every way. The standing stalks which served as a central support should be cut and removed with the fodder.

Handling and Preserving the Fodder.

The fodder should be removed from the lands and stored as soon as sufficiently dry to preclude any possibility of heating when piled up in bulk. It is a mistake to open the stooks, pick out the cobs and pile the stover up loosely till all the cobs have been removed; for it not only necessitates extra labour in handling it a second time, but causes considerable waste as well, besides incurring the risk of its being spoiled by rain. As the cobs are removed the stover should be tied in convenient bundles and at once placed conveniently, preferably on the cart or wagon, so that it can be taken to the shed or store, or placed where it is to be stacked. In this way each day's work is complete, and there is no stover lying about loose at the mercy of wind and rain. The same care must be exercised as with hay, for if it gets thoroughly wet after being removed from the stook it is troublesome to dry properly, and, needless to say, it deteriorates in value. It can be stored in bulk under cover, or, if necessary, it can be stacked in the open, but care must be taken to pile it closely and thatch the upper layers amply so as to keep out the rain. Mr. Wallace preserved his stover successfully in this way. The weathering of the outside layer is unavoidable in stacking the stover outside.

Removing the Cobs.

In studying the usual method of removing the cobs, I was rather surprised to note that the husk is opened without the aid of any device such as the "husking peg" (see illustration) used in America. Knowing the practical value of a contrivance of this kind, I do not hesitate to call attention to it. When once the knack of using it has been acquired a great deal of time is saved by its aid. It consists simply of a small round stick of hard wood—the heartwood of wild olive answers admirably—about three-eighths of an inch in diameter and five to six inches in length, depending on the size of the hand. One end gradually tapers to a point,

and is allowed to project an inch or so from the side of the hand, so as to be brought against the thumb. The peg is secured to the hand by a light leather band, which slips readily over the middle finger, thus permitting it to be put on and taken off with ease. The ends of the band are slipped over the peg to two slight grooves, one-half to three-quarters of an inch apart, cut opposite the finger for their reception. If only one groove is made to hold the ends, the band is apt to chafe the finger.

In using the peg, grasp the cob with the left hand, grip about half of the husk between the thumb and the end of the peg on the right, and pull it away smartly. This exposes the cob, so that it can be seized with the right hand and the remaining husk removed with the left. The stem of the cob is then firmly held by the left hand while the right breaks away the cob, which is done quite easily. Without the help of the peg, the tips of the fingers soon become tender, and this, needless to say, makes one handle the husk very carefully, and greatly reduces the speed in removing the cobs.

The Husking Peg. Method of using same.

Results.

The cobs were removed from the cut and uncut lands separately and weighed off for comparison. To look at the cobs from the fodder and those from the lands left to ripen in the ordinary way, one could not detect any difference. Placed on the scales, the cobs from the fodder proved to be somewhat lighter, but not so much as was expected, the difference amounting to about 10 per cent. This would easily be off-set in practice by the value of the stover alone. Although a certain amount of shrinkage was shown, it must be remembered that the lands having been selected from the crop as ordinarily grown were not absolutely alike. But for present purposes they showed conclusively that the fodder would cure successfully and without a serious shrinkage or deterioration in the cob. The cobs from the fodder were also drier than those from the standing mealies, and hence lighter from that reason as well.

It should be mentioned that many of the stalks had been blown down by a severe wind storm a month or more before cutting. At the time of removing the fodder it was found that many cobs which had been in contact with the soil were mouldy, but the mouldy cobs from the lands left

to ripen in the ordinary way were in excess of those from the fodder, showing an advantage in favour of the fodder from that standpoint.

I beg leave also to point out that by keeping the stooks in line at least one way, secondary crops can be sown if desirable, especially those which serve as food for ostriches. It has been pointed out by different farmers that the young weeds which spring up at the close of the maize season are valuable for ostriches, and that the cutting of the maize makes it possible for the birds to feed on them to better advantage. But from the entomological standpoint it is not advisable to encourage the practice of letting the weeds grow, because they serve as a food-supply for another maize pest, the "Surface Caterpillars" or "Cutworms," which many farmers consider more serious than the stalk borer, and in regard to which I hope to publish certain observation at an early date.

Other Tests.

At Mr. Herbert Wallace's farm, Collingham, near Grahamstown, a plot of mealies was cut as described above, and Mr. Wallace then continued the work, including the whole crop. The results were satisfactory as to both the curing of the fodder and the ripening of the cob. Part of the stover was fed unchaffed to stock; but this method was discarded in favour of chaffing it as needed. On one occasion an examination was made of the remains of the stalks where they were fed without cutting, but no live borers were found, the stalks having been tramped by the cattle. It is probable that if the borers were abundant some of them would escape the trampling. In such case the stalks that remain on the feeding ground by the first week in September should be destroyed.

At "Sunnyside," near Grahamstown, the maize had been so severely stunted by drought that it was of little value as far as the cobs were concerned, and in view of the encouraging preliminary results at Trappes Valley and Collingham, I urged Mr. Hards to cut them for fodder. He was doubtful of the results, stating that on a former occasion he had tried cutting maize, and that it went bad in the stooks. On going into the situation in detail I could see no reason for the unfavourable result, unless the maize was cut entirely too green, or else the stooks made too large, so that they bordered on silage conditions. In view of the unfavourable experience, I advised him to cut a few plots as an experiment in the manner just described under the work at Trappes Valley. He ultimately decided to cut all of them, but adopted another method of forming the stooks. The stooks were started by first driving a stake and fastening a number of stalks to it as a support. The stalks were then evenly placed around these, and the small stalks, etc., placed on the top, and then the whole stook protected by a covering of thatched stalks. Judging from the time the mealies were cut, they must have been fairly ripe when put into the stooks—a fortunate circumstance in view of later developments. I examined them some time afterwards, and found that they were curing satisfactorily, but I called Mr. Hards' attention to the fact that the stooks were rather too large and too tightly packed, and were settling down rather flat, thus practically excluding the air, and therefore verging on silage conditions. When the fodder was sufficiently dry the cobs were removed and the stover placed under shelter. As I had requested the privilege of taking a photograph of some of the stooks, they were not all removed at the same time. In the meantime rain had fallen, and Mr. Hards later on informed me that the fodder in the remaining stooks had gone bad. The only way in which I can account for it is that the stooks were too large and flat, and too tightly packed, as pointed out above, so that there was little or no chance of the moisture which had accumulated from the rain to escape. If the maize is too tightly packed and covered

in the air is practically excluded, thus bordering on silage conditions and increasing the chances for the fodder to go bad, especially under the influence of rain. It seems to me also that the type of stook used by Mr. Hards is more troublesome and requires more time to build, which means an increase in the item of labour. Aside from that, Mr. Hards reports very satisfactory results.

From the experience gained during the past season, I certainly advise adhering to the type of stook which has given uniformly good results in other parts of the world, and which was adopted in the tests at Trappes Valley and Collingham.

Effect on the Stalk Borer.

As pointed out in the *Agricultural Journal*, referred to above, the stalk borer will survive in maize cut for fodder and left without further interference. This observation has been duplicated the present season. It was therefore important to determine what likelihood there was of their surviving the feeding process. As pointed out in connection with the observations at Mr. Wallace's, a few may escape when the fodder is fed without first cutting or shredding it, but the destruction of the remaining portions would effectually cope with any that escaped tramping by stock. To determine whether or not any of the borers would come through a chaff-cutter alive, a test was made with two machines kindly provided by Messrs. C. J. Stirk and Co.—one an ordinary prickly pear cutter and the other an "Ohio No. 8½" chaff-cutter. Abundantly infested fodder, cob and all, was put through both machines, the cut being changed from time to time so as to determine the limit of length necessary to destroy all the borers. The three-eighths and the three-fourths inch cuts gave practically perfect results, no larva escaping, except in one instance, where a stalk was accidentally pushed through the prickly pear cutter in feeding. But this is wholly exceptional, and may be disregarded in practice. By removing one of the knives the prickly pear cutter was made to give a cut one and one-half inches in length. In this case over half the borers escaped, showing conclusively that this length is of little value as a means of destroying the borer. I had no opportunity of testing the work of fodder shredders used in America, but from what I know of their work I am satisfied that there would be even less chance for a borer to get through them alive. Men who have had extensive experience in feeding fodder prefer to have it shredded, for there is then no tendency to cause sore mouths in the stock to which it is fed. Apart from that, the results with the chaff-cutter are very satisfactory.

It is desirable to remove the cobs, because the grain is largely shelled off during the process of chaffing or shredding, and tends to accumulate at the bottom of the heap, and is apt to be unequally distributed in feeding.

Disposing of Surplus Stover.

It has been pointed out that by cutting the entire crop there would probably be more than could be used up before spring under present conditions, and that the remaining stover would then have to be put through the chaff-cutter in order to destroy the borers, and then be kept, with little prospect of its being used for stock food. But it seems to me that when its value as a stock food is appreciated the surplus, when shredded and thoroughly dry, could be baled the same as lucerne, and disposed of at a profit on the market in the ordinary way, and that it would be a great help to stock farmers in areas suffering from drought, for it would undoubtedly be a good investment to feed the baled stover in place of allowing stock to deteriorate seriously or even starve to death.

Trap Maize.

There is no clear evidence to show how far the moth—*i.e.*, the adult stage of the borer—will travel in search of maize or Kafir corn in which to deposit its eggs. Numerous observations show that the moths fly at night, and that they in all probability deposit their eggs in the first maize or Kafir corn they find. I am inclined to believe that where the fodder is stored a considerable distance from the lands it will be an easy matter to attract moths from stover, etc., to trap maize planted early and near where the stover is stored or stacked. This will prevent moth from going farther afield in search of food-supply. The first brood of moths emerging can thus in all probability be destroyed by feeding the young trap plants to stock by the first of December.

It has also been observed on several occasions that in clean lands adjoining a farm with old maize stalks, the infestation was most severe in the part of the land nearest the source of infection, showing that, as pointed out above, the moths are inclined to stop in the first maize plants they find. It, therefore, seems like a perfectly practical measure for the farmer to make early plantings of a few rows of trap plants between his main crop and the source of infection and disposing of them before the borers mature.

Impoverishment of the Land.

It may be objected in this connection also that the entire removal of the crop in the form of fodder again impoverishes the soil. But I would point out that if the fodder method is carried out it will not only be an advantage from the standpoint of saving stock food, but the bulk of the fodder will ultimately be returned to the land in the best form possible, *i.e.*, stable or kraal manure.

Other Methods of Control.

In this connection it seems desirable to call attention to the main features of other methods of control which have been suggested from time to time.

Late Planting.—In many parts the custom is to plant late—about the first of November in these parts—in order to have the maize come up after the moths have emerged and died. The difficulty is that under our conditions, late planting leaves but little latitude as to the choice of time to plant. If they are planted earlier, they are severely damaged by the borer; if later still, they stand a chance of failing to mature properly. It may also happen that the best time for planting, from the standpoint of weather and soil conditions, does not coincide with the time designated to escape the stalk borer. It is also recognised that as a rule the medium plantings—middle of September to middle of October—make the best crop. It is therefore highly desirable, from the farmer's standpoint, to manage the crop in such a way that the stalk borer will not be a factor in determining the time of planting the main crop. He can then take advantage of favourable conditions and thus stand the best chance of securing a maximum crop.

Thinning the Crop.—It has also been suggested that the seed should be sown very thick with the idea of having enough left after the borers have been satisfied. But the drawback is that they do not work systematically, so as to take out the plants necessary to thin the crop, but take them irregularly. When the plants are thinned afterwards, vacant patches are usually the result, which makes a full crop impossible for that season. To appreciate the importance of this point, it is necessary to

study the young crop, for, by the time the crop has grown well on to maturity, the irregularities are not so noticeable and are more apt to escape consideration. Infested plants that are removed at thinning time must be completely destroyed as otherwise the borers simply emerge and go into fresh plants. But by the time the crop is ready to be thinned, the damage has largely been done for that season, because the essential point is to protect the young plants. Besides, many of the plants may be infested, but the injury may not be sufficiently advanced to be detected, and the plants would then drop out later and leave the stand irregular. It would also be necessary to go over a field several times to destroy infested plants.

Silage.

Cutting the maize for silage not only preserves it in splendid condition for stock food but destroys the stalk borer as well. In addition to that, the silage will keep indefinitely so long as the silo is perfectly air-tight, and thus be available in times of drought if it is not earlier used. The drawback from the entomological standpoint is the fact that, as a rule, it is not desirable to cut the entire crop for silage. The remainder must still be disposed of in some way that will destroy the stalk borer. It is therefore necessary to resort to the fodder or some other appropriate method in connection with silage.

Acknowledgments.

It gives me pleasure to express my appreciation and thanks to Mr. V. E. Smailes, Trappes Valley; Mr. Herbert Wallace, Collingham; and Mr. H. H. Hards, "Sunnyside," for many courtesies during the progress of the work.

MEALIE HAY.

A Paper read at the September meeting of the Upper Albany Farmers' and Fruit Growers' Association, by HARRY H. HARDS, Sunnyside, Graham's Town.

In presenting this paper for your consideration and discussion, I make no claim to being an expert, neither do I claim to having discovered anything new, but having made the experiment and not having seen any report published of any such fodder prepared in the same way, in this Colony, I offer you a rough detail of my experience in arriving at the result, feeling that this fodder is one that has a great future before it and is one that can be prepared and is within the scope of any. The ground on which this hay was grown (about 7 acres) was under oats and just after the oathay was off was disced. One-eighth of it was manured with stable manure, one quarter kraal manure (cattle) and the balance had no dressing, but the whole had 100 lbs. to the acre of Thomas' phosphate applied mixed with fine kraal manure. The mixing of the dry kraal manure was done to facilitate the application.

The ground was ploughed and harrowed in December, the seed—presumably a bastard Hickory King—was drilled in on the 9th of that month, the seeds dropping about 6 inches apart and 3 feet between each row. The seeds germinated and the plants grew well enough up to a certain time when, as you all are aware, we had a very dry spell and the growth stopped. Notwithstanding the showers we had afterwards, the stalks did not make much further growth and at the time of cutting did not average more than 3 ft. 6 in. high. In addition to the want of rain, the high winds destroyed a large proportion of the leaves. In the meantime the horse cultivator was put through twice between the rows, and the rows were hand-hoed once, and the stalks cut out about *15 inches apart*.

On the 1st of June the stalks were cut with the sickle, and at the time were fairly free from excessive moisture, but the leaves were green to a certain extent.

I found from experience that it would be more economical in every way to use a small chopper, or a sickle with half the blade broken off, so that the stalks could be chopped, instead of the usual sickle action. Not only in this quicker, but the stalks can be cut level or even below the surface. As soon as the stalks were cut they were carried to the different spots were the stooks were built. You will note that the stalks were not allowed to remain on the ground any time, but whether it would be an advantage to let them do so and wilt, especially if the leaves are very green, remains to be proved. Unfortunately, I did not try any this way, so cannot compare results, but to my mind it would be worth while making the experiment.

The way the stooks were built was as follows:—A stake was driven firmly in the ground, and about 20 stalks placed upright round it and tied fast to it, other stalks were added evenly until a diameter of 4 to 5 ft. was attained, any small or short stuff placed on the top. A thatch of stalks was then made and the stook was complete. The main point in building these stooks is to keep out any rain. At the time of cutting the stalks, the grain on the cobs was dented and had lost its milkyness.

On the 29th of June, four weeks after cutting, we started to strip off the cobs and harvest the hay. The stalks being all one way, the boys had only to break the stooks, place an armful in front of them and with a piece of hard wood, pointed, proceed to rip open the leaves, take out the cob and throw it on one side. The stalks, as they were stripped of the cob, were drawn towards them until a fair size bundle could be made, say 15 to 20 stalks, when they were tightly tied together and placed on one side, loaded on the wagon, and stacked in an open shed.

The crop is more easily handled, and there is less waste by the breaking of the leaves when handled in this way.

The cobs were then collected, put into bags—for the convenience of handling—and placed into a hock to dry in the same way they are usually treated.

When the stooks were opened, the perfume was the same as the best of grass or lucerne hay, and the cobs when stripped were fresh and bright, but the grain had ripened, and little, if any, difference could be detected from grain taken off when the cobs are allowed to ripen in the usual way. There is, of course, no secret to account for the fact of the grain ripening after the stalk is detached from its roots. You will all know, it is a well-known fact, that most plants with seeds on, when cut at the proper time, although the seed is not ripe, and, if extracted from the pod, will shrivel and loose its germinating power. But being attached to the plant, the sap secreted in the tissues is sufficient, and does ripen the grain.

The actual result of the experiment is that approximately the *same weight* of *grain* was *harvested* as would have been had the cobs remained on the stalks standing on the lands to ripen, and in *addition, 5 tons of excellent fodder* was added to the credit of the crop.

In 1907 I also experimented on a much smaller scale in the same manner, but instead of thatching the stooks merely stood the stalks round after fastening a few together in the centre, the consequence was most of them blew down and the rain spoilt the whole of the hay. The cobs were, however, taken off and dried.

The following is an analysis of Hickory King mealie stalks as *green fodder*, taken from an Australian journal, the yield per acre being 26¼ tons:—Moisture, 82·43; Ash, 1·66; Protein, 2·10; Crude Fibre, 4·91; Nitrogen free, extract of Sugar Starch, etc., 8·37; Ether Extract of Fat, etc., 0·53.

Comparison with such a commonly used food stuff as Bran will perhaps best serve to illustrate the feeding value based on weight of crop and nutritive value. Taking the average analysis of Bran as containing: Protein, 11·2; Carbo hydrates, 42·2; Fats, 2·5; and allowing it to be worth, say, £6 10s. per ton, then the commercial value of *green fodder* would be as 5 to 1 of Bran. We must not overlook the fact that the foregoing figures *compare green fodder*, containing 82½ per cent. *of moisture*, with bran.

I have referred to the making of hay from the ordinary crop, sown for grain only, the side suckers being taken off as is the usual way. What can be done if seed is drilled closer for fodder only is shewn by the record of 26¼ tons of green fodder per acre. The hay is eaten readily by horses, mules, pigs and ostriches, and they do well on it. It is chaffed in the

ordinary way by a chaff and prickly pear cutter. To my mind there is no reason why this product, after having been properly cured, should not keep either stored or stacked in the open, equally as long as lucerne or any other hay. Its possibilities if shredded and compressed, or if mixed with other fodders and compressed, are great and worthy of being exploited. If during the coming season all of you will experiment for yourselves and in due course give our Association the benefit of your experience, I am sure it will be greatly appreciated and be of great benefit to us all. I am indebted to Mr. C. W. Mally, Eastern Province Entomologist, for the general idea of the experiment and also for many useful suggestions.*

At a subsequent meeting, Mr. Hards submitted the following:—When reading my paper on Mealie Hay at our last meeting, I promised to let you know the result of the analysis of this fodder. I now submit a summary of report received through the Agricultural Department from the Government Analytical Laboratory on the analysis of samples of Mealie Grain and Cob, and Mealie Hay submitted by me from the bulk of crop harvested and referred to in that paper. For the purpose of comparison I also submit the analyses of two other important fodders, viz., Lucerne Hay and Cape Oats. The analyses are taken from the Cape *Agricultural Journal*, and the latter represents 52 samples from eleven districts including Alexandria. These tables are well worthy of your attention and consideration, bearing as they do upon the feeding value of the fodder in question, viz., Mealie Hay.

ANALYSES.

	Cob and Grain.	Mealie Hay. Leaves and Stalks.	Lucerne Hay.	Cape Oats.
Moisture	25·37	16·33	14·3	9·85
Proteids	9·16	7·82†	14·7	9·53
Fat	1·57	1·25	2·6	6·03
Ash	1·24	8·91	6·3	--
Carbohydrates, including Fibre ...	62·66	65·69	28·5	60·77
Fibre...	3·91	21·33	33·7	10·20

* See article on Maize Stalk Borer by Mr. Mally in this issue.

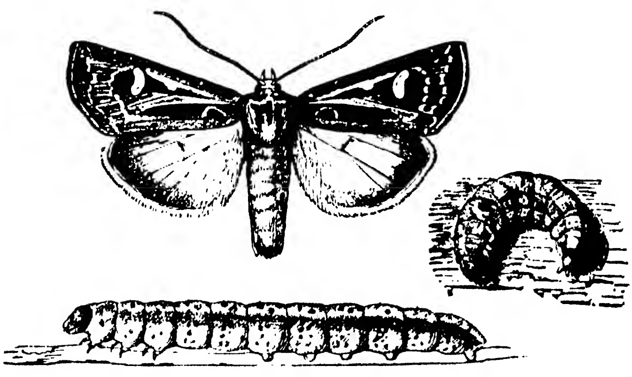
† [In order to avoid misunderstanding and possible disappointment it is as well to point out that the comparison of a single analysis, as given above, with an average of 52 analyses of other fodders is misleading, and can have very little actual value. The sample of mealie hay or stover (leaves and stalks) submitted was evidently abnormal, possibly owing to conditions which were not fully known. The proteid content of 7·82 per cent. approaches very near to the maximum shown in analyses published by the United States Department of Agriculture. But the average shown by the American investigations sinks to between 2 and 3 per cent., a condition which would probably be found similar in South Africa, were an equal number of samples analysed and an average struck of the whole. The proteid contents of field-cured stover in America are shown to vary from a minimum of a little over one per cent. to something over 8 per cent., with an average of between 2 and 3 per cent. Mr. Hard's sample thus comes just under the maximum, but to get anything like an exact notion of the feeding value of this fodder, it would be necessary to sample a number of such crops for analysis and find the average. It would have been better and more satisfactory had this been done in this case instead of basing deductions on the results of the analysis of one sample only.—Ed. *Agricultural Journal.*]

CUTWORMS.

POISONED BAIT REMEDY.

By C. W. Mally, M.Sc., F.E.S., Eastern Province Entomologist.

The plump greyish-brown Cutworms or Grubs often found in the soil around young plants which they have cut off near the surface of the ground come from eggs deposited by a number of different species of medium-sized night flying moths such as are often seen around lamps during a warm summer's evening. (See illustration.) The Cutworm stage is also referred to as the Surface Caterpillar, Mestworm, or Black Grub—the latter being used by farmers in some parts in connection with the destruction of the young maize plants. The term Mestworm should be discarded because it is also used for the large white grub with a brown head which is often found in heaps of manure, and also because the pest under consideration has nothing to do with manure. Many have the impression that it comes from manure because it is often more destructive in the parts of the land where manure has been spread. But this is no doubt due to the fact that the vegetation there is not only more succulent, but may have come up first, and hence attracted the pest from the unmanured parts. The moths may also have been attracted by the advanced condition of the plants and deposited their eggs there. The term *Cutworm* is used in these notes because it is concise and alludes to a peculiarity in the method of feeding.



One kind of Cutworm with Parent Moth to show general appearance (after U.S. Dept. Agric.).

Life History.

Their life history has not been traced in detail in this country, but a few essential points in regard to their development and food habits during the spring and summer months have been observed, and it seems advisable to call attention to them at this time for the indications are that they will be troublesome this season.

The majority of the species pass the winter as partly grown Cutworms in the soil. In colder countries they are dormant during the winter, but in these parts, owing to the mildness of the climate, they are more or less active, and may feed occasionally during warm spells of weather. On the return of warm weather (September) they again take full rations, which, compared to their size, is no small amount, and the majority are full grown in October, when they enter the ground and form cells in which to transform to the adult (moth) stage. The moths emerge in due time and deposit eggs for the late spring or summer generation. Different species vary as to the time of pupation: but for present purposes we need not go into detail in that regard. The broods of any given species also overlap considerably, no doubt mainly due to climatic conditions

Food Habits.

They feed at night and begin work by cutting through the stem of the plant close to the ground: hence the name *Cutworm*. During the day they hide away in the soil at or near the base of the plant on which they have fed. When hungry they emerge and hunt about for another plant. They have a large variety of food-plants—peas, beans, cabbage, tomatoes, tobacco, potatoes, maize—but, barring certain exceptions, they attack only the young, tender plants.

Unfortunately, exact information in the form of statistics is not available in this country, and therefore I can only speak in general terms: but from observations in different parts of the Colony, especially in the Eastern Province, I am satisfied that, could the annual loss to the maize crop alone due to Cutworms be put into exact figures, the sum total would be much greater than we imagine.

Preventive Measures.

During the autumn and winter months the Cutworms are, as a rule, dependent on the young weeds that spring up. (See illustration.) On these they subsist until fresh crops are sown in the spring. It is, therefore, evident that by clean cultivation and autumn or early winter ploughing, their food supply will be destroyed for such a long period that they must either starve or migrate to pastures new. Those near the sides of the field will probably find their way to the weeds or grass growing near by; but the majority will no doubt perish for lack of food.

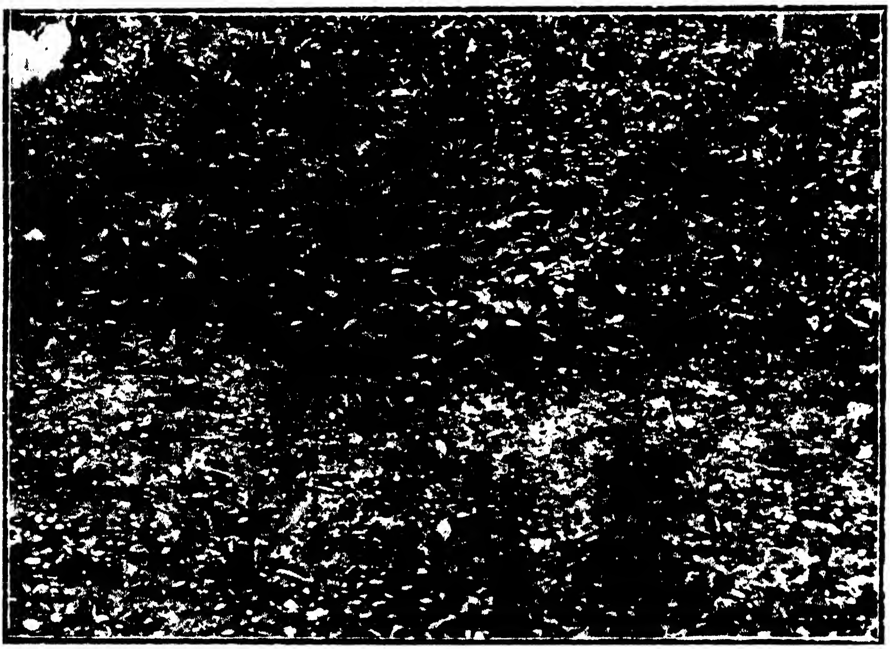
The fact that Cutworms are so very bad in gardens or lands that have been allowed to run fallow is due to the abundant food supply which has been present in the form of young weeds in great variety. Directly a garden or field is cleared up and fresh young plants of almost any crop appear in place of the weeds, the Cutworms attack them. But if this same land can be placed under clean cultivation during autumn and winter, the vast majority of the Cutworms will starve. In countries where intensive farming is the rule, and practically all of the land under control, clean cultivation gives good results because there is not much chance of fresh supplies of Cutworms, or the parent moths, coming from outside sources.

Clean cultivation is the ideal aimed at, but under our mild climatic conditions, the amount of waste veld immediately surrounding the cultivated lands, and the succession of crops which it is possible to carry, it may not always give the desired result. In fact, the secondary crops which I believe can be successfully sown immediately after a crop of maize has been cut for fodder, may in themselves be a food supply for the Cutworms. Again, weeds which ordinarily are despised and marked for destruction,

are highly prized for ostrich chicks in autumn because they serve as succulent food in great variety just at a time when other vegetation is going off. For that reason weeds themselves become a crop for the time being, and serve a good purpose.

In some parts high winds during the autumn and winter months make it necessary to secure the soil by means of plant growth of some kind, and a crop that would not attract Cutworms might not, under the circumstances, be profitable for the farmer. The need for an efficient means of destroying Cutworms, aside from clean cultivation, is therefore apparent.

In *maize culture* I would point out that in order to have a clear field for the control of the Cutworms, we must first do away with another pest—the Stalk Borer. Nowhere else in the world has the young maize crop to contend against such formidable foes as the *Stalk Borer-Cutworm* combina-



Heavy growth of young Weeds giving condition highly favourable to Cutworms.

tion I say *formidable*, because it is often the case that by trying to avoid or escape the first by half measures, we get into the way of the second just at the time when it is at its height for the season, and can therefore do the greatest amount of damage of which it is capable. If we plant at what is generally considered the *best* time—September or early in October, in these south-eastern parts, depending on the season—the chances are that the crop will be in the best stage to suit the Stalk Borer and the overwintering brood of Cutworms. If we plant late with the idea of waiting till the adults of the Stalk Borer have emerged and died, the chances are that the crop will be in the best stage to serve as food for the last of the Stalk Borer, and the full strength second brood of Cutworms. In a season when either one or both are abundant, the crop certainly has a bad time of it, and can only result in a poor return for the time and labour expended in caring for what is left. This last point should not

be forgotten, because it takes as much time and labour to grow a half-crop as it does a full crop. It is therefore necessary, if we expect to attain the best results, to effectually destroy the Stalk Borer in the winter stage in the stalks, either by the fodder or the silage method—or even burning the stalks if either of the preceding cannot be followed—in order that we may be free to plant the seed at whatever time the soil and weather conditions are most favourable. As will be seen from the spring and early stages of the Cutworms, planting the seed about the 1st of October will come the nearest to enabling the crop to come up between the two broods of Cutworms, and thus escape with the least damage under *ordinary* conditions. Planting at this time will also enable the plants to get a good start before the Kever (blackbeetle) is present in full force (late November and December) and hence the crop will suffer less from that cause as well. By combining the poisoned bait method, described later on, with early planting, we should be able to prevent serious loss.

It has also been suggested that since the moths are attracted by lights at night they can be trapped and destroyed in that way. Repeated tests which the writer made some years ago in America proved this method of trapping them to be not only expensive but practically useless as well.

Remedial Measures.

Poisoned Bait.—Poisoned bait in the form of bran or meal or bunches of green vegetation moistened with sweetened water containing an arsenical poison, at the rate of one pound of poison to 25 to 50 pounds of bran or meal, has long been used as a means of destroying Cutworms. But thus far, on account of the expense for material and the difficulty of distributing the bait wholesale, its application from the practical standpoint has scarcely extended beyond the limits of the seed-bed or garden. There was also the disadvantage that many of the Cutworms would probably find one or more plants before they did the bait. There was also the danger that the bunches of poisoned bait would be picked up by stock.

While studying a serious outbreak of Cutworms on Mr. W. H. Barnes' farm, Collingham, near Grahamstown, in the spring of 1905, it occurred to me that by cutting up any available green stuff (lucerne, barley, forage, cabbage or rape leaves, young succulent weeds, etc.) into small bits, say half an inch in length, it could be moistened with the poisoned sweet and then scattered broadcast over the lands with the least labour and material. In this way it is distributed evenly and at such frequent intervals that the Cutworms are practically certain to find it before they do the plants. Their fondness for sweets induces them to fully engorge themselves on the bait, a fact which makes their destruction certain. There is also no danger to stock, for the pieces of bait are so small that nothing but poultry or ostriches can pick them up, and it is not likely that even they will get enough to injure them. But as a precaution they should be kept from the lands where bait has been spread. Mr. R. H. Lloyd, then in charge of Mr. Barnes' place, co-operated in the work, and reported good results. Mr. Herbert Wallace also tried it on one occasion, using rape leaves for the purpose. The Cutworms were fairly well developed at the time, and I was not sure that their disappearance was entirely due to the bait.

During the past six months several additional experimental tests have been made for Cutworms, and with satisfactory results. I see no special difficulty in the way of its application on a large scale to lands planted with tobacco, maize or other crops, and therefore call attention to it for the benefit of any who may have occasion to use it during the next few months.

METHOD OF PREPARATION.

I have used the following mixture:—

Arsenite of Soda	1 lb.
Treacle, or brown sugar	8 lb.
Water	10 gal.

Dissolve the arsenite of soda and the treacle in the water. In the meantime cut up the lucerne, or other green stuff into small bits, and then moisten it with the poisoned sweet. Be careful not to make it too wet or it will not scatter well when broadcasting it.

For best results, the bait should be distributed a few days after the ground has been ploughed, and all green, succulent vegetation destroyed The Cutworms that are not crushed in ploughing will then be on the surface again, and on account of their long fast, practically all of them will be prowling about in search of food. In this way one application will probably be sufficient. If injury is noticed after the young maize plants appear, the application should be repeated.

In one test, finely cut lucerne was moistened with a mixture consisting of 14 pounds (one gallon) of treacle and one pound of arsenate of lead in five gallons of water, and then sown broadcast over a plot of ground known to be infested with Cutworms. The effect was very marked, the treated part suffering very little, while in the untreated the injury continued. In this case the bait certainly was moist enough to be attractive the second night, especially under the influence of dew. But this strength is practically double what will be required ordinarily

On another occasion, 25 pounds of bran was moistened with three gallons of water containing one-half gallon of treacle and one pound of arsenate of lead. This mixture was easily distributed by broadcasting it, and the treacle was sufficient to keep the bait in attractive condition for several nights. No further injury was noticed, but the Cutworms were not sufficiently abundant for a good test. Cutworms certainly are very fond of sweetened bran, but whether it can be sown thinly enough to come within the expense limit from the practical standpoint, and at the same time destroy the Cutworms, can only be determined by comparative tests under suitable conditions. Although bran has certain advantages, it means a cash outlay, whereas green bait is available on the farm, and can therefore be used with the least cash expenditure.

For the protection of cabbage, tomato, or tobacco plants the bait should be distributed a few days in advance of transplanting. Since the Cutworms feed at night, the bait should be cut, treated, and distributed as late in the day as possible, and still allow time enough for the work to be finished before dark. In this way the bait will be fresh during the feeding time of the Cutworms, and the chances are that the majority will be destroyed the first night. By using a large amount of treacle or sugar, it will remain sufficiently moist to be attractive, even though the green bait itself withers during the next day, and any Cutworms that were not abroad the first night will probably take to it the next. On two occasions a Cutworm was observed on a lucerne stem which had been treated with poison sweet; but, although its mouthparts were moving, it made no visible impression on the stem. It seems likely that it was simply removing the film of sweet from the surface. If it continued that for the same length of time ordinarily spent in feeding, it would in all probability get a greater amount of poison, and its destruction would be the more cer-

tain. This is in harmony with observations on a large number of the Crinum Borer in a bed of narcissus which had been treated with a sweetened arsenical spray. Some of them had their mouthparts in contact with droplets of the sweet as it drinking it. The slight amount of injury to the leaves after the spraying certainly did not seem sufficient to account for the number of borers destroyed. If it proves to be the rule that Cutworms are sufficiently attracted by poisoned sweet to remove it from hard or otherwise unattractive portions of the bait, it may greatly simpilfy the work, for we can then use anything that will serve as a carrier for the sweet.

In using the bait on a large scale soon after planting, it is not necessary that the bits of green stuff be thickly sown—just a good sprinkling over the ground suffices. This will save material as well as time in application. Proceed as in broadcasting for grain; or the boys can be sent out on horseback, as was done in distributing finely cut poisoned barley during the last locust campaign. Slit a bag across the middle on one side, sew or tie up the end and place an equal amount of bait in each end and sling it across the horse. The bait can then be easily reached with either hand and distributed. Supply bags should be conveniently placed so as to save time in taking on a fresh supply for distribution.

It is best to select an evening when there is no special prospect of rain, for if the bait is distributed just before a rain the poisoned sweet will all be washed off, at least from the upper side of it, and thus reduce its efficiency.

Garden Work.—For garden work the bait should be distributed a few days previous to setting the young plants, if possible. But if favourable rains make it advisable to transplant immediately, the bait should be scattered between the rows, and as close to the plants as possible *without touching them*, because the arsenite, being soluble, will burn them. If the garden is large, broadcasting may again be advantageous, but in such case arsenate of lead or Paris green must be used. These compounds do not injure the plants, and hence no harm will be done if some of the bait lodges on them.

Destroying by Hand.—In small gardens, it is advisable to dig out and destroy the Cutworm where a plant has been attacked, but the drawback is that the culprit is only discovered by means of the injured plant, and in a few days the loss will be rather heavy. In the case of maize, this method can hardly be followed on account of the labour required. But even in lands of maize it is surprising what can be accomplished by hand-picking. On October 21st and 22nd Mr. Herbert Wallace, Collingham, near Grahamstown, collected the Cutworms from each of two lands of maize about 200 yards square and secured a total of over two thousand. This will no doubt make a great difference in the crop, for, had they not been interfered with in any way they would have taken practically all of the plants. As it is, especially if the lands can be gone over again, only a certain amount of replanting will be necessary.

The above lands had not been neglected, but had been carefully cultivated last season, and produced a fair crop of maize, considering the drought. The maize was cut for fodder, and ostrich chicks were turned in to feed on the young weeds as they came up. They kept the weeds down about as close as could be expected; but even so, there was food enough for the young Cutworms, because they take the plants before they are really large enough for the chicks. Pasturing maize lands with ostriches is therefore of no value from the standpoint of clean cultivation as a preventive for Cutworms.

In view of the labour necessary to maintain clean cultivation, the item of labour in hand-picking, even in large fields of maize, would not be such a serious item if all of the Cutworms could be secured at once; but some are sure to be missed, and it is therefore necessary to do a certain amount of replanting, which means an irregular crop. Besides, the work must be done during the busiest time for the farmer, and the chances are that he will fail to do it on account of underestimating the damage that is being done, or overlooking it entirely until serious loss has been sustained. This only emphasises the importance of applying poisoned bait before the plants come up, for it can be done cheaper and more uniformly then than at any other time, and the full stand of maize from the first planting will not be interfered with.

Thick Sowing.—Sowing a large amount of seed with the idea of having plants enough left after the Cutworms have helpel themselves is not advisable, because the plants are taken out irregularly, and they will therefore be too thick in some places and too thin in others. Besides, it will require extra labour to thin them.

Spraying.—The fact that Cutworms usually begin feeding on the stem of the plant close to the ground makes it useless to try and cope with them by means of a poisoned spray, because it is impossible in a practical way to lodge the poison where most needed, and the plants would have to be eaten to destroy the worms.

Barriers.—Protecting individual plants by encircling them with strips of cardboard or tin is often resorted to in special cases, but it is of very limited application.

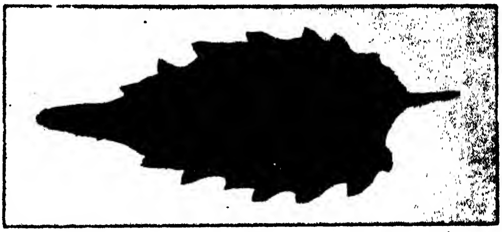
Natural Enemies.

Birds.—Birds are often mentioned as possible enemies of cutworms, but so far I have not been able to get any clear evidence that they are a factor in the problem. The fact that Cutworms work at night and hide in the soil during the day is a very strong point in their favour, for they will not only have to be detected, but dug up as well. I have often studied young maize plants that have been dug up by birds, in this country as well as in America, and I am satisfied that they are after the remains of the maize seed, and that the destruction of a Cutworm is merely a matter of chance. I have quite recently seen a number of cases where healthy plants have been dug out in close proximity to plants that have been eaten off by the Cutworms. This was so striking in several cases that it suggested the possibility that the Cutworms are distasteful to certain birds, so that in place of digging them out they will leave them and take a plant close by.

The most likely chance for benefit to be derived from birds is at the time of ploughing or scarifying. Some birds, no doubt, do destroy a great many insects at that time, and for that reason insectivorous birds should be protected. Some birds may like Cutworms. while others refuse them. Careful observation is therefore necessary to show which birds are important in this connection.

Ants.—Ants frequently attack Cutworms and drag them to their nests. This is especially noticeable during early September, when the Cutworms emerge from their winter quarters. In view of the fact that ants are not only abundant, but widely distributed as well they undoubtedly destroy a great many Cutworms; but it is impossible to give even an approximate estimate of their value as a factor in the problem.

Disease.—Sometimes a great many Cutworms are found dead from a bacterial disease. (See illustration.) The activity of the disease seems to depend on the meteorological conditions. Given proper conditions of heat and moisture, it is apt to spring up wherever Cutworms are abundant. As soon as the conditions change the disease disappears until conditions are again favourable. There seems little chance of doing any good by the wholesale distribution of artificial cultures, for they will simply lie dormant till conditions are right. When that time comes the disease springs up naturally. The only advantage would be in the fact that if the artificially distributed cultures survived there would be a much greater supply of infection in the field awaiting suitable conditions. The same is true of the chinch-bug fungus (*Sporotrichum globuliferum*) in America, and the locust fungus in this Colony.



Leaf of Weed with diseased Cutworm.

In the spring of 1905 a similar disease was found in the lucerne caterpillar. As soon as the first cases were noticed artificial cultures were made in quantity and diluted with water and applied to the lucerne in the form of a spray. There was a slight difference apparent in favour of the sprayed parts, but in a very few days the disease was so widespread in lucerne everywhere that the effect of the spraying was obliterated.

When the conditions are right, insect diseases no doubt do a great deal of good; but aside from that we can accomplish but little by artificial distribution, unless an effectual method of using them is discovered. In this connection it should be stated that the known fungus and bacterial disease of insects do not affect stock.

THE REGISTRATION AND PURCHASE OF FERTILISERS.

By C. F. JURITZ, M.A., D.Sc., Senior Government Analyst.

In connection with the Act to regulate the Sale of Fertilisers and certain other articles, passed by the Legislature last year (No. 20 of 1907), a Proclamation was issued on the 14th September last, promulgating a series of regulations for the effectual carrying out of the Act. Copies of these regulations may be had on application to the Department of Agriculture, Cape Town, but it is evident, from correspondence which has taken place with merchants and others, that several of the points dealt with therein need explanation in order to be clearly understood both by merchants and farmers. There is, of course, no desire to array farmer and merchant against each other, but simply to accord fair treatment to each. These notes have therefore been drawn up with a view to serve in the first place as a guide to merchants in the registration of the various fertilisers which they propose to sell, in order that they may be in a position clearly and correctly to describe such fertilisers, and secondly to farmers, so as to enable them to comprehend the meaning of the merchants' terms and descriptions, and get to know exactly what they are buying.

REGISTRATION OF BRANDS.

To attain this object, it is perfectly evident that one of the first requisites is some figure, mark, or design whereby every fertiliser, or, at all events, the fertilisers of any particular firm, may be instantly recognised by intending purchasers. Hence the regulations recently promulgated require each vendor of fertilisers annually to register with the Department of Agriculture, an approved "brand" under which such fertiliser will be sold (see regulation 1); and no fertiliser may be sold unless this distinctive "brand" has been properly assigned to it (regulation 5). The brand may include such words as "superphosphates," "bone meal," etc., but it is essential that it should comprise at least some easily recognisable letter, figure, mark, or design.

STATING OF PERCENTAGES.

It appears to be in connection with the mode of expressing the composition of the fertilisers that most difficulties are likely to arise. First of all single definite figures should be given, and not amounts ranging

over ½ or more per cent. It has been habitual in many cases to state the percentages somewhat in this way: 30—32% total phosphoric oxide; 4—4½% nitrogen; 45—49% potash. If in one case a range of 1% is given, in another there might be a range of 2%, and in others 3% or more; the purchaser may consider that an article marked 30—36% is superior to one marked 30/32%, when it may happen that the former contains just over 30 and the latter possibly 32. If, therefore, the vendor cannot guarantee exact proportions, he should take the lowest figure and register that and that only.

Phosphoric Oxide.

As to the individual constituents whose percentages are to be stated, a few words may first be said regarding phosphoric oxide. The expression phosphoric *oxide* should be consistently used, as that expression clearly and without ambiguity denotes the fundamental constituent of all phosphatic manures. Such terms as phosphoric acid and phosphates, which do not always convey a clear and precise meaning, ought to be rigorously avoided on invoices and registers. Moreover, it is not sufficient to state merely the "total phosphoric oxide" and leave out of account the *soluble* phosphoric oxide. In two fertilisers the respective totals may be equal, but the one may contain much more water-soluble or citrate-soluble phosphoric oxide than the other, and hence be correspondingly more valuable. It should here be explained that three forms or grades of phosphoric oxide have to be taken into account in connection with fertilisers. Of these three grades the most valuable is the readily soluble, or *water-soluble phosphoric oxide*: it is chiefly in this form that phosphoric oxide is present in superphosphates, and generally speaking in all "dissolved" phosphatic materials, such as "dissolved bones" and "dissolved guano." Next in value is the *citrate-soluble phosphoric oxide** the form in which the phosphates are mainly present in basic slag or Thomas' phosphate. Last of all is the *insoluble phosphoric oxide*, which forms practically all the phosphate of bone meal, bone flour, and raw guano. *Total phosphoric oxide* means the sum of the last three. Water-soluble phosphoric oxide is often spoken of as quick-acting phosphate, while insoluble phosphoric oxide is called slow-acting: for official purposes, however, the latter terms should not be used in place of the more precise expressions above mentioned. A further explanation is necessary with regard to citrate-soluble phosphoric oxide: the exact phraseology of the registration form prescribed by regulation is "phosphoric oxide soluble in citrate solution," and it may perhaps be expected that the strength of the citrate solution which is to be the standard of judgment should be stated. For this purpose the following extract from the regulations promulgated on the 27th December, 1906, by the Board of Agriculture and Fisheries (Great Britain) under the "Fertilisers and Feeding Stuffs Act, 1906," should be sufficient: "When in an invoice relating to basic slag or basic superphosphate it is specified that a certain percentage of the phosphate contained in the basic slag or basic superphosphate is soluble in citric acid, this shall be taken to mean that it is capable of being dissolved to the extent of such percentage when 5 grammes of the fertiliser and 500 cubic centimetres of water, containing 10 grammes of citric acid, are continuously

* In applications for registration and in invoices citrate-soluble phosphoric oxide need be stated only in respect of basic slag and basic superphosphate: it will, however, be advisable to include it if in sufficient amount to be valuable.

agitated in a flask or bottle of about 1 litre capacity for the period of half an hour at the ordinary temperature."†

Nitrogenous Fertilisers.

Another of the requisites to be stated in applications for the registration of fertilisers is "the form in which nitrogen is present." In many fertilisers it may suffice here to fill in the words "organic," "ammoniacal," or "nitric" as the circumstances of the particular case may necessitate, but where mixed organic fertilisers are concerned, the form of the nitrogen should be more specifically stated, as for instance, leather meal, shoddy, fish or flesh, blood, horns, hair, etc. It is quite possible that 6% of nitrogen derived from such a substance as leather would be less valuable than 2% derived, for example, from dried blood.

It will, no doubt, be understood that the term *organic* is used where the nitrogen exists as animal or vegetable matter. *Ammoniacal* nitrogen, which is usually in the form of ammonium sulphate or chloride, is more readily available than the organic form.

The manner of stating the *percentages* of nitrogen in such an article as sulphate of ammonia will be referred to later. At the present stage it may suffice to say that an article containing 23% of the latter salt is correctly registered as containing 4·8% of nitrogen, an amount equivalent to about 6% of ammonia. Of course, in a case like this the form in which the nitrogen is present is entered as "ammoniacal," the term "nitric" being used for nitrate of soda, nitrate of potash, etc., the nitrogen of which in the soil is even more soluble than ammoniacal nitrogen.

Potash.

The same principle holds good here that has already been indicated with respect to phosphoric oxide and nitrogen: the percentage to be stated should not be that of the potash salt *as such*, *e.g.*, sulphate of potash, muriate of potash, etc., but that of the potash itself. The potash in sulphate of potash amounts to approximately 54% of the latter. To convert "sulphate of potash" into "potash" all that has to be done is to multiply the percentage of the former by 54 and divide by 100. An article, therefore, that contains say 90% of the sulphate would contain 48·6% of pure potash, and this is the figure that should, in such a case, be inserted in the application for registration.

To state that a fertiliser contains such and such a percentage of "potash salts" is vague, unsatisfactory, and misleading; still more objectionable is the use of the term "alkaline salts."

Potash, like phosphoric oxide, may be present in fertilisers in three forms. The first of these is water-soluble, and includes the *potash salts*, which commonly go by the names of sulphate of potash, kainit, muriate of potash, chloride of potassium, or sylvinite. Then there are the *organic* forms of potash; amongst these are such articles as tobacco stems, cotton seed hulls, beet-sugar factory refuse, and so on: these are soluble only in acids. Finally there is *felspathic potash* and other similar materials which are, for all practical purposes, insoluble. In all fertilisers the form in which the potash is present is an important element, and above all in

† The method adopted in the Government Laboratories here has been by means of Petermann's solution, and is described at length on page 56 of my annual report for 1896.—C.F.J.

mixed fertilisers a statement should be made as to whether the potash is there as potash salts, or as wood ashes, or in whatever other condition it may exist.

Lime.

Generally speaking, it is not the usual practice in other lands to take much account, at all events for valuation purposes, of the amounts of lime present in fertilisers, but with the many soils in this Colony that betoken decided evidences of the lack of lime, the importance of that substance as a direct plant food has come to be more definitely realised in practical experience than elsewhere. Hence it has been regarded as of sufficient moment to know the proportion of lime contained in fertilisers on the market to make it advisable that statements of such proportions be made by applicants when desiring to register their fertilisers.

Need of Uniformity.

The different ways in which it has been customary to state the proportions of the several components of fertilisers are nowhere better illustrated than in respect to superphosphates. A few years ago three samples of superphosphates obtained from one particular firm in Cape Town had been marked by the firm's European representatives as shown below. I attach also the results of our analyses:—

Name.	Lime per cent.	Phosphoric oxide per cent. Total.	Citrate Soluble.	Water Soluble.
Superphosphate 26%	22·97	14·82	14·44	11·96
Superphosphate 30%	23·22	15·61	15·24	13·13
Superphosphate 37%	26·12	19·25	19·11	17·81

A year later, three superphosphates were procured from the same firm, and their analyses, as well as the manner in which the samples were labelled, is shown in the table below:—

Name.	Lime per cent.	Phosphoric oxide per cent. Total.	Citrate Soluble.	Water Soluble.
Superphosphate 12/14%	20·91	15·35	14·03	11·67
Superphosphate 14/16%	21·83	16·48	15·35	12·28
Superphosphate 17/18%	25·20	18·47	18·39	15·39

It is plain that by the 26% phosphate of the former year was meant the same article as the 12/14% of the latter; the 30% and the 14/16% superphosphates were one and the same thing; likewise the 37% and the 17/18%: but farmers who are not acquainted with the different ways in which one and the same fact may be presented would not unnaturally have taken a 26% superphosphate rather than a 17/18%, and as a result would have had an article inferior to that which seemingly contained a much smaller proportion of the essential ingredient. In one sense the method of labelling the superphosphates exemplified in the first of the above two tables may be as correct as that shown in the second. Perhaps a simpler case may first be taken to illustrate how this can be. One merchant—let us call him A.—may offer for sale what he calls "sulphate of ammonia, 20%"; B. may sell—probably at the same price—an article

marked "sulphate of ammonia, 23%," while C. stocks "sulphate of ammonia, 85%," and charges the same price as the other two. One ignorant of the meaning of these figures may think that he is doing good business by purchasing C.'s 85% article in preference to the others, but the fact may be that he would have done better to have bought from B. at the same price, and still better had he dealt with A. "But," he may reply, if one ventures to put him right, "A. sells sulphate of ammonia of only 20% strength; how can that be better than B.'s 23%, and C.'s 85%?" 85%, yes, but of what? A different complexion is put on the matter when the purchaser discovers that A.'s fertiliser contains 20% of *nitrogen*, B.'s 23% of *ammonia*, and C.'s 85% of *sulphate of ammonia*, and furthermore, that 20% of nitrogen means exactly the same thing in such a case as 24¼% of ammonia and 94¼% of sulphate of ammonia.

In a similar manner one brand of phosphatic fertiliser may be labelled according to the proportion of phosphoric oxide which it contains, and another, at a much higher figure, according to the percentage of tricalcium phosphate, and it was something of this sort that occurred in connection with the two tables of superphosphates above given. In the first table the articles had been labelled according to their percentages of monophosphate of calcium, in the second according to their percentages of phosphoric oxide, and 23 parts of the one are approximately equal to 14 of the other. Hence the necessity of insisting, as the recently promulgated regulations do, upon uniform methods of stating percentages. Hence, too, the necessity of seeing to it that the goods sold and bought are marked, so to speak, in plain figures as to their component parts.

Invoice Certificates.

Regulation 4 provides that the vendor of any fertiliser shall furnish his customer with a statement of the component parts of the article, and, by way of illustrating how this is to be done, a blank form is printed. All terms or expressions which may, however undesignedly, mislead, should be avoided in filling in such an invoice certificate. Under "nitrogen" the percentage of nitrogen, and not of ammonia or of sulphate of ammonia, should be inserted; under "potash" there should be an equally definite statement; sulphate of potash, muriate of potash, or chloride of potassium are substances of which no cognizance should there be taken; "lime" is simple enough, but with regard to "phosphoric oxide" the remarks already made must be borne in mind, and of course it is not enough to insert only the total phosphoric oxide for the reason already referred to. The need of this becomes obvious from instances such as the following: Three fertilisers are invoiced as each containing total phosphoric oxide 10%, and so far the invoice may be absolutely correct. One of these, however, is an insoluble phosphate rock powder in which practically all the phosphoric oxide is insoluble; the second may be a basic slag containing most of its phosphoric oxide in the citrate-soluble state; the third consists of dissolved bone, with a large quantity of water-soluble phosphoric oxide. No. 3 would be altogether the most and No. 1 the least valuable of the three if their composition were as follows:—

	No. 1 per cent.	No. 2 per cent.	No. 3 per cent.
Water-soluble phosphoric oxide	0·25	0·25	8·00
Citrate-soluble phosphoric oxide	0·75	8·00	1·50
Insoluble phosphoric oxide	9·00	1·75	0·50
Total phosphoric oxide	10·00	10·00	10·00

The purchaser has a right to expect that the figures on the invoice are so plainly stated as to entail no calculation on his part in order to ascertain how they would be affected by being expressed in the terminology of the regulations. In other words, as it is put in a circular issued for similar purposes to the present notes by the Department of Agriculture and Technical Instruction for Ireland (Leaflet No. 17, revised): "When an analysis is not stated in a proper manner, it is unnecessary for the purchaser to convert 'sulphate of ammonia' into 'nitrogen,' 'sulphate of potash' into 'potash,' etc.; instead, he should compel the seller to give him an invoice made out according to the requirements of the Act. Any farmer who cannot obtain a proper invoice when purchasing manures should immediately report full particulars of the case to the Department."

Expert Advice.

Merchants will readily understand that, in regard to the filling in of the registration forms, points may arise which can scarcely be settled by one outside of or unacquainted with the details of their business connections, otherwise than as a direct professional adviser; and firms will, of course, under such circumstances, in their own interests, naturally consult a private analytical chemist, or be guided by such advice as their European correspondents, themselves acting under the guidance of their own consulting chemists, would give. Unless they seek such expert advice they may offer for registration high percentages which cannot possibly be maintained in the average of their consignments. Hence the importance of their making quite sure of their ground by obtaining, wherever such is not furnished them by their representatives abroad, reliable analyses of average samples of their goods. Such analyses very naturally must not be sought at the hands of the Government Analysts, firstly because their functions are those of inspectors and referees, and secondly because of the undesirability of Government competition with the practice of private chemists. At the same time there are doubtless many other matters on which the Government Analysts may, without prejudice, give advice, and indeed it is with a view to lessen any difficulties that may fall under this category that the present memorandum has been drawn up, for the information of merchants and others interested. These may in the meantime rest assured that no arbitrary action will be taken by the Government, and that all possible information will be supplied on any points that are at all obscure.

Where any question exists as to the true composition of any fertiliser which it is intended to register, steps would no doubt be taken by the merchant to have it analysed locally by a private analyst, who would be asked to furnish the analytical results in the form required by the recently gazetted regulations.

The Government Analysts are occasionally asked by merchants to provide them with formulæ for making up mixed fertilisers for special purposes, such as potato manures and fruit fertilisers. In addition to the reasons already given, there are other circumstances which render it undesirable that the Government should prescribe formulæ for such purposes. So much depends upon the soil and site, for instance, that a fertiliser made up according to recipe may answer in one locality, and be nothing but a disappointment in another, and if, after adopting a prescription drawn up under these circumstances, failure follows in the wake, nothing would be easier than to blame the Government. It would be altogether invidious and undesirable for the Government Analysts to make special recommendations of such a nature to individual firms: these belong to the category of subjects that would very well come within the province of a private professional adviser.

Useful Factors.

It is quite probable that merchants may in some cases feel that there is no need to incur the expense of having their wares analysed over again, as they are prepared to stand or fall by the percentages guaranteed by their representatives in Europe; and yet, those percentages may have been put in a form that would not be acceptable under the lately promulgated regulations. Where this feeling exists, and the figures are not in the form required by the regulations, they may be simply adapted to suit the needs of the latter. If, for instance, the proportion of tricalcium phosphate is stated, instead of that of phosphoric oxide, the former may be converted into the latter by a simple multiplication process, and this principle is of effect in regard to many of the fertilisers on sale: a few samples hereof are the following:—

To convert sulphate of ammonia into ammonia: Multiply by 17 and divide by 66.

Sulphate of ammonia into nitrogen: Multiply by 14 and divide by 66.

Ammonia into nitrogen: Multiply by 14 and divide by 17.

Muriate of ammonia (chloride of ammonium) into nitrogen: Multiply by 28 and divide by 107.

Muriate of ammonia into ammonia: Multiply by 34 and divide by 107.

Nitrate of soda into nitrogen: Multiply by 14 and divide by 85.

Nitrate of potash into nitrogen: Multiply by 14 and divide by 101.

Nitrate of potash into potash: Multiply by 94 and divide by 202.

Sulphate of potash into potash: Multiply by 94 and divide by 174.

Muriate of potash (chloride of potassium) into potash: Multiply by 94 and divide by 148.

Tricalcium phosphate (phosphate of calcium; Tribasic phosphate of lime, or bone phosphate) into phosphoric oxide: Multiply by 142 and divide by 310.

Bi-phosphate (or di-phosphate) of calcium into phosphoric oxide: Multiply by 142 and divide by 272.

Monophosphate of calcium (superphosphate or soluble phosphate), into phosphoric oxide: Multiply by 142 and divide by 234.

Tricalcium phosphate into lime: Multiply by 168 and divide by 310.

Bi-phosphate of calcium into lime: Multiply by 112 and divide by 272.

Monophosphate of calcium into lime: Multiply by 56 and divide by 237.

Some Examples of Trade Descriptions.

Below are given a few instances of the way in which manufacturers very frequently state the composition of their fertilisers, and opposite to each the correct manner of stating the proportions of the active constituents.

Article.	Manufacturer's description.	Corrected Statement.
Sulphate of ammonia ...	94% purity	19½% nitrogen.
Sulphate of ammonia ...	20% ammonia	16½% nitrogen.
Muriate of potash ...	Muriate of potash 80% ...	50% potash.
Sulphate of potash ...	Sulphate of potash 91% ...	49% potash.
Superphospbate ...	Superphosphate 35% or soluble pho-phates 35%.	21% water soluble phosphoric oxide.
Bone flour	Bone phosphates 60%... ...	27½% phosphoric oxide.

The following is an example of what may be called an utterly misleading manner of stating the composition of a fertiliser.

Total phosphates	14	per cent.
Soluble phosphates	12	,,
Sulphate of ammonia	7	,,
Potash salts	10	,,

These figures look big enough at a rapid glance, but the glamour is much diminished when they are correctly stated as follows:

Citrate-soluble phosphoric oxide	$6\frac{1}{4}$	per cent.
Insoluble phosphoric oxide	1	,,
Nitrogen	$1\frac{1}{2}$	,,
Potash	$1\frac{1}{3}$	,,

Figures thus given occasionally need very close scrutiny. The following was given as the composition of a fertiliser sold in the State of New York for 25 dollars per ton:—

Total phosphoric oxide	22·21
Insoluble phosphoric oxide	20·81
Available phosphoric oxide	1·40
Potash soluble in water	0·13

In this case it was the first two lines that were intended to catch the eye, but all that was worth having was contained in the third and fourth lines, and the fertiliser was not worth more than $1\frac{1}{2}$ dollars per ton.

Sources of Ingredients.

When dealing with the individual components of fertilisers, remarks were made to show the necessity of having clear statements with regard to the form in which this or that constituent of a manure is present. It is quite possible that unless such a declaration is made fraud may be perpetrated, although all the while a correct statement of the constituents —as far as mere figures go—is given. What is meant may be gathered from the following example: two fertilisers may each be correctly stated to have the following composition:—

Nitrogen	$1\frac{3}{4}$	per cent.
Potash	$2\frac{3}{4}$	,,
Phosphoric oxide	$9\frac{1}{2}$	,,

A mixed fertiliser of approximately the above composition may be obtained by compounding together the following ingredients:—

225 lbs. of nitrate of soda, containing $15\frac{1}{2}$% nitrogen.

425 lbs. of kainit, containing $12\frac{1}{2}$% potash.

1350 lbs. of dissolved phosphate, containing 14% phosphoric oxide, and the fertilising value of such a mixture may be considerable.

But a comparatively valueless fertiliser, containing exactly the same percentages of nitrogen, potash, and phosphoric oxide may be prepared

by substituting leather meal for nitrate of soda, powdered felspar for kainit, and ground apatite or phosphate rock for dissolved phosphate.

Mechanical Condition.

It may be desirable to draw attention to one or two features in connection with fertilisers that have not as yet been made the subject of regulation; one of these is the proper consideration of a fertilisers mechanical fineness. The coarser the state of sub-division of a fertiliser, other things being equal, the less suitable it will be for promoting the growth of the crop. A fertiliser which is in a sufficiently finely divided state to be capable of passing in its entirety through a sieve with ¼-inch holes is more valuable and efficient for its purpose than one the bulk of whose particles are so coarse that anything finer than a ½-inch sieve will not allow them to pass through. Although with water-soluble manures, like nitrate of soda, sulphate of potash, and sulphate of ammonia, this point is of comparatively little moment, it is of more importance in dealing with bone-dust or bone-meal, which should invariably be of sufficient fineness to permit of 80% thereof passing through a sieve of eight meshes to the linear inch,* and it becomes a matter of great importance in mixed fertilisers, especially if organic, and with basic slag sufficient fineness of division is paramount. At least 75 per cent. of the slag should pass through a wire sieve of 100 meshes per linear inch: if coarser than this its value is correspondingly depreciated.

Fertilisers to be True to Name.

Another point that it is desirable to emphasise relates in particular to four or five special classes of fertiliser. Certain trade names have acquired definite meanings, and when articles are purchased under those names the purchaser has a right to expect that the implied conditions are fulfilled in respect of the article purchased. Thus *bone meal*, if genuine, will contain from 22 to 26% phosphoric oxide (total) and from 3¼ to 4% nitrogen. When phosphoric oxide is low, nitrogen is high, and when nitrogen is low, phosphoric oxide is high in proportion. If in any article these conditions are not fulfilled, the article is probably not wholly what it claims to be. *Steamed bone flour* should, as to its mechanical condition, be of the fineness of flour, and as to its chemical contents, consist of from 27 to 30% of phosphoric oxide with nitrogen ranging from 1 to 2½%. *Dissolved bones* ought to be pure, that is to say, free from everything except natural bones and sulphuric acid. *Thomas' slag* or *basic slag* (*Thomas' phosphate*) should be of the fineness specified above, and at least 80% of its phosphoric oxide should be citrate-soluble.

These are points that should be borne in mind in connection with regulation 6, to the effect that no person shall sell any fertiliser not of the composition *or nature* demanded.

Manufacturers are presumed to be acquainted with the composition of their fertilisers: they are free to make whatever guarantee they please, but there is nothing arbitrary, when once such guarantee is made, in requiring that the essential character of the fertiliser shall conform to it. It may be at times that through imperfect mixing one ingredient is low in proportion. In such cases the other ingredients should be correspondingly

* In Western Australia the sale of bone dust or bone meal which does not conform to this condition, is an offence under the "Fertilisers and Feeding Stuffs Act, 1904."

high. Such samples may be considered as equal in *value* to the legal guarantee.*

In the State of Indiana, U.S.A., commercial fertilisers have been considered as divisible into the following nine classes:

1. Equal to guarantee in every particular.
2. Equal to guarantee in value.
3. Within 10% of value of guarantee.
4. Not within 10% of value of guarantee.
5. With one or more ingredients 20% below guarantee.
6. With one or more ingredients 30% below guarantee.
7. With one or more ingredients 50% below guarantee.
8. With one or more ingredients 60% below guarantee.
9. With one or more ingredients 70% below guarantee.

An annual list is published stating the names of the firms whose fertilisers have been examined during the year and classifying the fertilisers of each such firm on the above basis. What is meant by class 2 has already been explained. Fertilisers of class 3, although not considered as showing deliberate intent to defraud, are nevertheless such as do not give purchasers full value, and proportionate compensation could therefore be reasonably claimed. Class 4 betokens inexcusable carelessness, gross ignorance, or fraudulent intent. The fertilisers of the remaining classes are of essentially different character to what they claim to be, even though, as may sometimes prove to be the case, bad mixing is responsible for this.

It remains to add that the Indiana fertiliser law is in its essential principles the same as that of this Colony. Every person desiring to offer for sale material for manurial purposes is required to file with the State Chemist an application, and to register the brand of the fertiliser and its guaranteed composition.

Complete fertilisers, that is to say, those which aim at supplying the crops with nitrogen, potash, and phosphoric oxide,† are frequently classified on a commercial basis into different grades. The classification adopted in New York State, U.S.A., is arranged on the values stated below, the average composition being added in each case.

Class.	Commercial value per ton.	Nitrogen %	Available phosphoric oxide.*	Potash %
Low grade	Below £3 6s. 6d.	1·22	8·18	2·60
Medium grade ...	From £3 6s. 6d. to £4 3s. 4d.	1·70	9·10	3·48
Medium high grade	,, £4 3s. 4d. to £5 4s. 2d.	2·47	8·82	6·02
High grade ...	Above £5 4s. 2d.	4·00	8·36	7·22

* *i.e.*, citrate-soluble.

It may be of value to importers of fertilisers from England to say just here that section 8 of the British Fertilisers and Feeding Stuffs Act, 1893, provides that "the expressions 'soluble' and 'insoluble' shall respectively mean soluble and insoluble in water."

* This principle, it must be remembered, can be acted on only within reasonable limits: one fertilising ingredient cannot take the place of another.

† If they contain every ingredient in which a Colonial soil is likely to be deficient the proportion of lime becomes a consideration.

Sampling for Analysis.

The regulations of the British Board of Agriculture* on the sampling of fertilisers for analysis provide that in the first instance a number of bags or packages are to be selected from different parts of the entire stock of the fertiliser whose composition is to be ascertained. Where the whole quantity to be sampled is less than one ton, at least two bags or packages are to be taken; at least three bags must be taken if the whole stock is between one and two tons in quantity: if it is between two and three tons four bags must be selected, and one additional bag for every five tons over and above three tons, provided that in no case need more than ten bags or packages be selected.

"The selected bags or packages shall be emptied separately on a clean and dry floor, worked up with a spade, and one spadeful from each set aside. The spadefuls so set aside shall then be thoroughly mixed together, and any lumps broken up by the hand or spade. From this mixture a sample of from two to four lbs. in weight shall be taken."

"When the fertiliser is delivered in bulk, a like number of portions, according to the quantity of the whole consignment, shall be taken from different parts of the whole consignment, and thoroughly mixed, and a sample taken as above."

"When the fertiliser consists of bulky materials, uneven in character and likely to get matted together, such as shoddy, wool refuse, hair, etc., portions are to be taken from the selected bags or packages, or from different parts of the fertiliser if in bulk, the matted portions torn up, and all the portions thoroughly mixed together. The sample shall be taken from the mixture and shall not be less than 3 lbs. in weight."

Commercial Valuation.

A few concluding remarks appear needful in regard to this important part of fertiliser inspection work. The commercial valuation of a fertiliser is always based upon its results as yielded on chemical analysis: it consists simply in calculating the trade value of the fertiliser from the trade values of its different ingredients, viz.: nitrogen, phosphoric oxide,† potash, and lime.

Let us take a concrete case: imagine a fertiliser to be composed as follows:—

Lime	19·16	per cent.
Potash	1·52	,,
Nitrogen	2·78	,,
Phosphoric oxide	10·67	,,

Assume the trade values of the ingredients to be such that one per cent. of each has the following values:—‡

	s.	d.
Lime	0	10
Potash	5	5
Nitrogen	10	0
Phosphoric oxide	5	5

* Promulgated December 27, 1906.

† Insoluble phosphoric oxide in superphosphate is not valued.

‡ These, it may be explained, are what are called the "unit values" of the several active components, and are deduced from the ruling market values of such standard articles as superphosphate, bone meal, sulphate of ammonia, and Kainit. Those given above are not to be taken as necessarily representing present local values.

Then the value of the imaginary fertiliser (per ton) would be arrived at as follows: —

Lime	10d.	×	19·16	=	£0 15 11½
Potash	5s. 5d.	×	1·52	=	£0 8 3
Nitrogen	10s. 0d.	×	2·78	=	£1 7 9½
Phosphoric oxide	5s. 5d.	×	10·67	=	£2 17 9½
Value of mixed fertiliser per ton					£5 9 9½

To this should be added a suitable margin for conveniences resulting from the supply of such an article ready mixed, etc. Now, there are certain definite advantages obtained by thus assigning commercial values to fertilisers. They show whether a given fertiliser is worth what it costs the farmer; even if it costs 20 to 25 per cent. more than its valuation it may still be economical to purchase it, but the more the cost exceeds the valuation the less wise such a purchase will undoubtedly appear. Then, comparisons between the valuations and sale prices of a series of fertilisers of the same type will indicate which of these gives the best value for money. It should of course always be borne in mind in this connection that although to a certain extent, taking account of the *forms* in which nitrogen, phosphoric oxide, etc., are present in the fertiliser, it is only to a limited extent that this can be done, and hence commercial valuation must never be taken as a hard and fast standard.

THE COMPOSITION OF SALT FROM SOME COLONIAL SALT PANS.

By Dr. C. F. Juritz, Senior Government Analyst.

(Paper read before the Cape Chemical Society on the 17th July, 1908.)

The agriculturist, carrying on farming operations in this Colony, soon comes to realise, by practical experience, what is far from being as forcibly brought home to his confrere in the garden countries of the Old World, that there are often vital difficulties in the way of successfully cultivating soils well endowed with all the chemical constituents of plant food. We know, for instance, only too well, that there are thousands of square miles of land with all the potentialities of fertility and productiveness, whose only lack is water: other large tracts there are, possessing the same potentialities, gifted, moreover, with abundant supply of water in close proximity, but where cultivation is made difficult, or rendered impracticable owing to the alkalinity or brackness of the soil. It may be that this alkalinity does not ordinarily show itself at the soil surface, but is accumulated two, three, or four feet below: when, however, water is led on the land, and sinks down to the saline layer, the salts enter into solution, and in that state they remain, if there be no under-drainage to carry the salty liquid away. Subsequently, on evaporation of the water from the surface, the capillarity of the soil mass carries upward the saline liquid: this, in turn, loses its water by surface evaporation, and the salts, till then dissolved in the water, are deposited on or near the surface, as an alkaline incrustation or efflorescence. As we all know, this frequently proceeds to such an extent as to render the soil quite barren.

Occurrences of similar character are met with, here and there, in other parts of the world as well. In California, in India, and in Egypt, for example, they have had to be dealt with. Reports on the nature and composition of these efflorescent salts have been published on various occasions by the administrations of the countries named, and Professor E. W. Hilgard especially, of the University of California, has contributed greatly to general knowledge on this subject. Great variation has been shown to exist in the composition of the salts referred to, and, although the saline constituents of any one salt are rarely more than five in number, the list comprises in all no fewer than the following thirteen compounds: Potassium sulphate, chloride, and carbonate; Sodium sulphate, chloride, carbonate, phosphate, and nitrate; Calcium chloride; Magnesium chloride, sulphate, and phosphate; and Ammonium carbonate. The sulphate, chloride, and carbonate of Sodium are usually the most abundant, while the sulphates of Calcium and Magnesium are generally present in smaller proportions.

It may be of interest to compare with the results which come to us from abroad a few analyses of efflorescent salts from one or two places within the Cape Colony.

At Thebus, in the Steynsburg Division, where, some years ago it was proposed to carry out an extensive irrigation project, two specimens of an efflorescence of this kind, but more or less mixed with earth, were collected.

These, upon analysis, yielded the percentage results given in columns A and B, respectively, of Table I. On making due allowance for the admixture of earth in these specimens, the proportions per cent. in the pure salts would work out somewhat as shown in columns C and D, which correspond respectively to A and B. An artificial production of the efflorescent salt was brought about by enclosing a quantity of the soil in the neighbourhood to a depth of several feet, with a metal cylinder, drenching the soil with water, and permitting it to dry by evaporation. The layer of salt, which was thus formed on the surface, had the percentage composition shown under E.

In the vicinity of Van Wyks Vlei, in the Carnarvon Division, there are similar occurrences of salt incrustations. No direct analysis of any of the salts thus occurring in that locality has yet been made, but from an analysis of the soluble constituents distributed throughout the soil, the figures in column F are deduced as their general composition at the soil surface. With this may be compared results quoted by Hilgard* of an analysis of alkali occurring in California (Imperial): see column G. In their respective percentages of Sodium, Calcium, and Magnesium chlorides, the resemblance between the latter and Van Wyks Vlei salt is striking.

Now when salts such those above referred to, leached out from the surrounding salt-impregnated soil by rain, or conveyed from a distance by rivers, are carried into a depression below the general level of the surrounding country, and the water in which they are dissolved can find no outlet save by evaporation, the ensuing concentration of saline matter in course of time results in the formation of a saltpan. At Van Wyks Vlei, where there is a constantly alternating concentration of salts and dilution by inflowing water, the amount of chlorine has upon occasion been found to be as high as 1154·6 grains per gallon, a proportion not very far below that of the ocean. At another time it was found to have diminished to 517 grains per gallon, and a recent analysis showed only 210 grains per gallon, with the principal constituents of the dam water as stated in column H, Table II. The water from a borehole in the neighbourhood of the dam contained the proportions of the various salts as shown under K.

The composition of water draining from a brack soil was also illustrated at Thebus, by sinking a pit on the site of the projected dam: when analysed, the water which accumulated in this pit was found to contain the quantities of salts given in column L.

Having glanced at the composition of the efflorescent salts as they occur in what we may, without being misunderstood, call their parent soil, and having noted something of the effect of these salts on the water which passes over and through such soil, we may take a further step and see what was once, no doubt, a fresh water dam, now undergoing rapid transition into a salt pan, and already arrived at the stage of a salt lake: such an one is Varsch Vlei, at Maraisburg, in the Cradock Division, whose name seems somewhat incongruous. A sample of water—or, more properly speaking, brine—thence procured, contained in solution the proportions of mineral salts stated under M. The composition of this water, in parts per 100, was as follows:—

Calcium sulphate	1·72
Magnesium sulphate	·79
Magnesium chloride	·94
Potassium chloride	·10
Sodium chloride	31·50
Total solids...	35·07

* "Soils; their formation, properties, etc.," p. 442.

As previously observed, it is readily comprehensible that lagoons which are continually being supplied with waters of the character of some of those referred to, will, where the outlet is inadequate to carry off the inflowing water, become converted, in course of time, into salt lakes. A clear illustration of such a process may be seen, at any time, on the farm Drooge Vlei, near Darling, in the Malmesbury Division. There is no apparent spring in the vlei or lagoon, and the water drains into it from the surrounding veld during the rainy season. Recently, when addressing you on the underground waters of the Colony, I drew attention to the prominence of Magnesia in the waters derived from the Malmesbury series of rocks, and, in the water from this vlei, that fact is accentuated. A partial analysis resulted in the following figures, in grains per gallon:—

Lime	148·6
Magnesia...	279·4
Sulphuric oxide	401·0
Chlorine...	2550·2
Total salts	4827·2

Here the salt is apparently very largely Sodium chloride, with a considerable proportion of Epsom salts (Magnesium sulphate), some Calcium sulphate, and a little Sodium sulphate.

In the formation of such a salt lagoon there are, of course, various contributory causes, which need not here be considered in detail: as far as concerns coast salt-lands, these causes may be accounted for with comparative ease, but in what have been called terrestrial salt-lands there may now and then be some difficulty. Without discussing these difficulties, it may be said that the terrestrial salt-pans are usually either of local origin, or are produced, according to the method already mentioned, by means of river-borne salt, so that, broadly, the salt-pans of this Colony may be classified as (1) coast pans, (2) inland pans, and (3) river vleis.

The coast pans, as a rule, are the result of an overflow, or a percolation, from the sea, past or present; the inland pans of local origin have not yet, as far as I am aware, been satisfactorily accounted for, or, more correctly speaking, the ultimate source of the salts whence they derived their supply has not been definitely traced; respecting the river vleis, the general indications given above will probably suffice for the present.

South of the Olifants River on the west coast, on the Bredasdorp coast in the south, and at Zwartkops, near Port Elizabeth, occur instances of coast salts, for, in the cases mentioned, beach deposits, more or less recent, appear to have been the source of supply. The inland pans, as the Geological Survey has resulted in proving, are largely coincident with the belt of country where the Dwyka series of rocks prevail, and from these rocks they are apparently derived. The Dwyka formation is, however, not the only source of salinity in the soil, for, as above remarked, alkaline salts occur abundantly in the soils of the Steynsburg Division, and also in the neighbouring divisions of Middelburg and Cradock, where the geological formation is that of the Beaufort series. At Calvinia, Carnarvon, Clanwilliam, Fraserburg, Hope Town, Kenhardt, Kimberley and Prieska are numerous salt pans of this class.

Of the river vleis, Salt River marsh, and Zoetendal Vlei, in the Bredasdorp Division, as well as Bot River Vlei and Klein River Vlei in the neighbouring division of Caledon, will serve as examples.

Coming now to the salt pans themselves, the results of analyses of several specimens of salt which have been analysed in the Government Analytical Laboratories—most of them quite recently—are comprised in Table III. Regarding the salts whose analyses are recorded in this table it may be said that, with few exceptions, the primary object of the analy-

sis was to ascertain to what extent foundation existed for a very widespread belief—one to which expression had been given repeatedly during the last twenty years, especially in Griqualand West and Bechuanaland—that they contained substances injurious to stock, when used as cattle licks, or when added to their food. In most cases, it will be seen, the salts are of considerable purity, even where the process of preparation is somewhat primitive, and, as far as they are concerned, there is no ground for the popular fancy.

The salt-pan from which No. 1 was taken is owned by the Bechuanaland Salt and Estates Company, and yields annually some 3,000 bags of salt. The sample—like most of the others in the table—represented a natural salt.

In the case of No. 8, the process adopted was to pump the brine into shallow beds, scooped out of the ground, for evaporation, the residue of salt being afterwards collected. This process was subsequently modified by spreading bucksails over the shallow beds, thence obtaining a cleaner salt. This purer article, represented by No. 7, and known as bucksail salt, had, however, not yet been prepared in very large quantities. It had been customary to supply No. 9, described as "dirty salt," and light grey in appearance, to farmers for use as a cattle lick, No. 8 being more utilised in the towns. No. 10 was taken from a pan which had not, at that time, been worked to any great extent, but was believed to be capable of affording a practically limitless supply. No. 11 was a later, and obviously purer salt from the same locality.

Nos. 12 to 15 were collected from different parts of a pan about six miles in circumference. The practice generally in vogue for obtaining salt in this locality is as follows: Holes, three to six feet deep, are sunk in the pan, the brine is transferred from these holes to shallow evaporating beds dug out from the earth in the vicinity. In the course of a day or two, when the liquid has evaporated, the residual salt is collected, and placed in bags, realising, when sold, about fifteen pence per bag. The approximate quantity thus disposed of annually is said to be about 4,800 pounds weight, but it is understood that the pan is capable of yielding an incomparably larger supply.

Nos. 18, 19 and 20, which are from the Thebus area, took the first prize at the 1908 Port Elizabeth Agricultural Show, and Nos. 21, 22, and 23, from the same locality, had taken the second prize at the 1907 Show.

The saltpan near Perseverance, more commonly associated with the name of Zwartkops, whence samples 44 to 53 were obtained, yields over 50,000 bags of salt per annum. It is presumed that the saline character of the lagoon is derived from a raised beach deposit, but it is noteworthy that, not only in the Uitenhage Division, but also in other parts of the country where the geological formation known as the Uitenhage series appears, boreholes and springs have been found to contain considerable proportions of common salt: instances of this may be noticed at Glenconnor in the Uitenhage Division, at Niekerk's Hope, Sandflats, Mimosa, and Addo, in the Alexandria Division, at Welbedacht near Oudtshoorn, and also at Mossel Bay.

The Jacobsdal Saltpan, in the Orange River Colony, produces an excellent quality of natural salt. Of this, Nos. 60, 61, and 62, which obtained the first prize at the Port Elizabeth Agricultural Show in 1907, are typical samples.

Included in the appended table are results of analyses of seven samples, Nos. 66 to 72, from localities whose identity I have not been able to trace, and the last analysis on the list, No. 73, represents a salt of Colonial manufacture, prepared by an artificial process, with the details of which I am not acquainted.

Unfortunately there is no analysis available of the salt from the Matsap pan in the Division of Hay, but evaporation of a sample of water from the pan yielded a salt composed as follows:—

Potassium nitrate	2·11	per cent.
Sodium chloride	73·80	,,
Magnesium chloride	4·63	,,
Magnesium sulphate	16·98	,,
Calcium sulphate	2·16	,,
Calcium carbonate	trace.	
Oxide of iron and alumina...	faint trace.	

In this state the article could of course not be used for table purposes, on account of the large proportion of Magnesium salts, and for the same reason there is certainly a possibility of its proving unadapted as a cattle lick, but fractional crystallisation would naturally obviate this defect. As already stated, no analysis of the actual salt supplied from this pan, after fractional crystallation, has been made. The pan is said to be the only one of its kind in that division and is about eight miles in length. For the preparation of the salt thirty flat steel evaporating pans are employed, fixed on a staging four feet above ground to enable the dust to pass below instead of over the salt. These evaporating pans have not been in use for much more than two years, and are now producing about twenty bags of salt monthly, for which there is a ready sale. In the Matsap salt pan the level of the brine varies from six to eight feet below the surface; the brine is obtained by sinking pits about five feet deep, and from these pits it is poured into the steel evaporating pans and left to evaporate under the influence of the solar heat. The greatest obstacle to the manufacture of a refined salt lies in the dry and dusty nature of the pan, great clouds of dust being caused by the slightest wind.

One more salt may be mentioned: it was received in a moist condition from Varsch Vlei, at Maraisburg, the locality which produced some of the salts already enumerated. This particular sample, however, was obviously procured from the pan under different conditions, as the results of its analysis immediately show:—

Calcium sulphate	3·59	per cent.
Magnesium sulphate	·25	,,
Sodium sulphate	60·77	,,
Sodium chloride	·29	,,
Silica and insoluble material	2·09	,,
Water	33·02	,,

On looking through the accompanying tabulated results it will be observed that, for the popular idea regarding the bad quality or injuriousness to stock of Colonial salt, there is very little foundation. Exceptions there may possibly be, in rare cases, and even where this is so it is a question to what extent responsibility may rest, not with the inherent character of the salt, but with the mode of collection and preparation.

One word remains to be said, and that has reference to the economic production of salt within the Colony. Judging from information supplied, there is an abundance of salt to be had, much more, apparently, than sufficient to supply the present demand for the colonial product; but the industry, according to the 1904 census, gives employment to only 266 persons, distributed amongst some twenty pans. At the same time the salt industry is one that should be capable of profitable working, for, taking again the figures of the 1904 census, the land under occupation is valued

at an aggregate of £42,000, the buildings and plant thereon at £15,000 more—a total of £57,000. During the census year alone the total output was valued at £15,000, that is to say, an average of about 27 per cent. on the capital, and this at a cost in materials of only £1,400. On the other hand, we are importing into this Colony, annually from oversea, half a million pounds weight of rock salt, and twelve million pounds of kitchen and table salt—these are the figures for 1907. During the same year, we sent out of the Colony, to other South African States, to German South-west Africa, and to Tristan d'Acunha, somewhat over four million pounds of prepared kitchen and table salt, the produce of this Colony. Into the whole of British South Africa the total amount of kitchen and table salt imported from oversea was 21 million pounds by weight during 1906, and 28 million pounds during 1907, and in addition nearly one million pounds of rock salt in each year. There seems no reason why the Colonies should not be entirely self-sustaining in this respect, and probably a little care and attention in the preparation and general get-up of the colonial product would go a long way, especially in view of the great purity in which the salt is obtainable, to ensure for it a readier sale in the South African market.

TABLE I.

ANALYSES OF SALT EFFLORESCENCES.

	Thebus, Steynsburg Division.					Van Wyk's Vlei.	Imperial California.
	Mixed with earth.		Free from earth.				
	A	B	C	D	E	F	G
Calcium carbonate ..	·010	·020	·83	1·34	trace	·55	nil.
Calcium sulphate ...	nil.	nil.	nil.	nil.	10·86	4·15	nil.
Calcium chloride	nil.	nil.	nil.	nil.	nil.	60·30	58·42
Magnesium carbonate	·008	nil.	·66	nil.	nil.	nil.	nil.
Magnesium sulphate..	nil.	·048	nil.	3·21	37·21	nil.	nil.
Magnesium chloride ...	nil.	nil.	nil.	nil.	nil.	1·80	2·81
Sodium carbonate ...	nil.	nil.	nil.	nil.	nil.	nil.	·58
Sodium sulphate ...	1·122	·895	92·80	59·87	11·64	nil.	nil.
Sodium chloride .	·058	·491	4·80	32·84	40·16	33·20	31·82
Sodium nitrate	—	—	—	—	—	—	8·21
Potassium chloride . .	—	—		—	—	—	1·15
Insoluble matter, etc., undetermined ...	—	—	·91	2·74	·13		—
Total saline constituents	1·209	1·495		—	—	—	

TABLE II.

ANALYSES OF WATERS.

(The results are expressed in grains per gallon.)

	Van Wyk's Vlei.		Thebus.	Varsch Vlei.
	H	K	L	M
Calcium carbonate	17·86	147·95	8·87	nil.
Calcium sulphate	nil.	76·86	nil.	1204·0
Calcium chloride	nil.	nil.	nil.	nil.
Magnesium carbonate	7·62	nil.	16·54	nil.
Magnesium sulphate...	30·21	177·57	nil.	553·0
Magnesium chloride	nil.	nil.	nil.	658·0
Sodium carbonate	nil.	nil.	6·68	nil.
Sodium sulphate...	98·83	nil.	6·76	nil.
Sodium chloride...	346·80	358·98	6·35	22050·0
Potassium chloride	—	—	—	70·0

TABLE III.

Serial No.	Locality, &c.	Calcium. sul-phate.	Calcium. chlor-ide.	Magnesium. sul-phate.	Magnesium. chlor-ide.	Sodium. sul-phate.	Sodium. chlor-ide.	Moisture.	Insoluble matter.	Analyst.	Serial No.
1.	Bechuanaland: Groot Chwaing, Vryburg	trace	nil.	trace	nil.	1·88	97·58	·28	·26d	Britten	1
2.	,, Zoutpans Puts, near the Molopo	,,	nil.	,,	nil.	·48	98·55	·01	·96d	,,	2
3.	,, Sandveld, 30 miles east of the Molopo ...	,,	nil.	,,	nil.	·62	98·31	·29	·78d	,,	3
4.	,, Zoutpan, Honey Nest Kloof	3·40	nil.	,,	nil.	4·61	90·97	·01	1·01d	,,	4
5.	,, ...	1·51	1·23	nil.	trace	nil.	96·04	·01	1·21d	,,	5
6.	,, Bechuanaland Salt and Estate Co.	·83	nil.	·81	nil.	9·39	87·78	1·11	·08d	Van der Riet.	6
7.	Kimberley: Zoutpansfontein, Riverton Road, Bucksail salt	·71	2·38	nil.	trace	nil.	95·13	·84	·94d	Britten.	7
8.	,, ,, ,, Ordinary clean salt	1·12	4·78	nil.	·43	nil.	89·89	1·86	1·92d	,,	8
9.	,, ,, ,, Dirty salt	1·26	nil.	1·38	nil.	·64	91·08	3·20	2·44d	,,	9
10.	,, Fort Richmond, Belmont	1·65	nil.	7·59	nil.	8·04	74·30	5·36	3·06d	,,	10
11.	,, ,, ,, ...	·37	nil.	·06	nil.	3·20	93·83	·89	1·65d	,,	11
12.	Herbert: Herbert salt pan, north	2·40	nil.	·66	nil.	1·46	94·07	·05	1·36d	,,	12
13.	,, ,, ,, south	trace	nil.	trace	nil.	2·96	96·99	·07	trace	,,	13
14.	,, ,, ,, east	,,	nil.	,,	nil.	1·07	97·99	·98	,,	,,	14
15.	,, ,, ,, west	3·08	nil.	,,	nil.	·62	93·37	1·56	1·37d	,,	15
16.	,, ...	trace	nil.	,,	nil.	2·98	95·47	·05	1·50d	,,	16
17.	Hopetown	·58	nil.	2·64	nil.	2·02	91·04	2·90	·82d	Watermeyer	17
18.	Schoombie: Victoria Salt Works, Middelpan, Fine salt ...	·39	nil.	trace	nil.	·14	98·61	·84d	·02	Flack.	18
19.	,, ,, ,, Medium salt	·80	·02	nil.	trace	nil.	98·36	·80d	·02	,,	19
20.	,, ,, ,, Coarse salt	·60	·04	nil.	,,	nil.	98·10	1·24d	·02	,,	20
21.	,, ,, ,, Fine salt ...	·31	·19	nil.	·36	nil.	97·65	1·34d	·15	Muller.	21
22.	,, ,, ,, Medium salt	·31	·12	nil.	1·33	nil.	96·98	1·06d	·20	,,	22
23.	,, ,, ,, Coarse salt ...	·78	·12	nil.	1·12	nil.	96·30	1·37d	·31	,,	23
24.	,, ,, ,, ...	2·04	nil.	·42	·09	nil.	93·32		4·13d	Juritz.	24
25.	,, ,, ,, ...	1·32	·67	nil.	1·35	nil.	96·39		·27d	Watermeyer.	25
26.	,, ,, ,, B quality ...	·88	1·58	nil.	1·11	nil.	95·55	·35	·53d	,,	26
27.	,, ,, ,, BB quality ...	·62	1·07	nil.	1·49	nil.	95·68	·50	·64d	,,	27
28.	Cradock: Varsch Vlei, Maraisburg, No. 1 salt	1·16	nil.	1·38	nil.	nil.	97·36	·36	trace	,,	28
29.	,, ,, ,, No. 2 salt	2·00	·75	nil.	·47	nil.	96·70	·35	,,	,,	29
30.	,, ,, ,, No. 3 salt	2·41	·42	nil.	·31	nil.	95·33	·34	1·19d	,,	30
31.	,, ,, ,, Extra fine salt	1·55	nil.	·58	·18	nil.	97·83	·15	trace	,,	31
32.	,, ,, ,, Ground salt	2·13	nil.	·33	1·16	nil.	96·43	·13	,,	,,	32
33.	,, ,, ,, ...	·75	nil.	·87	·31	nil.	96·02	1·67d	·38	Muller.	33
34.	,, ,, ,, ...	·46	nil.	·68	·10	nil.	96·75	1·84d	·17	,,	34
35.	,, ,, ,, ...	1·12	nil.	1·17	nil.	·07	95·46	1·81d	·37	,,	35
36.	,, ,, ,, ...	·73	nil.	·92	·26	nil.	95·63	2·10d	·36	,,	36

"d" denotes figures obtained by deducting the sum of the other percentage results from 100.

TABLE III—(*continued*).

Serial No.	Locality, &c.	Calcium. sul-phate.	Calcium. chlor-ide.	Magnesium. sul-phate	Magnesium. chlor-ide.	Sodium. sul-phate.	Sodium. chlor-i e.	Moisture.	Insoluble matter.	Analyst.	Serial No.
37.	Cradock : Varsch Vlei, Maraisburg	·73	nil.	·78	·14	nil.	95·99	2·00d	·36	Muller.	37
38.	,, ,, ,,	·61	nil.	1·14	nil.	·16	95·94	1·88d	·27	,,	38
39.	,, Long Pan, 1st class	3·53	·06	nil.	1·42	nil.	93·79	·49	·71d	Watermeyer.	39
40.	,, ,, 2nd class	2·32	nil.	1·68	nil.	nil.	95·71	·23	·06d	,,	40
41.	,, ,, 3rd class	1·64	nil.	1·42	·21	nil.	94·98	·87	·88d	,,	41
42.	Piquetberg : Onderplaats	·32	·44	nil.	·27	nil.	97·26	1·03	·68d	,,	42
43.	Berg River	·49	trace	nil.	·51	nil.	97·30	1·02	·68d	Juritz.	43
44.	Zwartkops : Zwartkops Saltpan Co.	·61	·01	nil.	·48	nil.	97·09		1·81d	Flack.	44
45.	,, ,, ,,	·56	·07	nil.	·60	nil.	97·11		1·66d	,,	45
46.	,, ,, ,,	·27	nil.	·12	·49	nil.	96·97		2·15d	,,	46
47.	,, B quality salt	·92	nil.	trace	trace	nil.	97·48		1·60d	Juritz.	47
48.	,, Zwartkops Saltpan Co. Fine salt	·61	nil.	1·09	2·98	nil.	84·31	10·89d	·12	Muller.	48
49.	,, ,, ,, Medium salt	·38	nil.	·05	·72	nil.	96·46	2·15d	·24	,,	49
50.	,, ,, ,, Coarse salt	·41	nil.	·16	·48	nil.	95·34	3·48d	·13	,,	50
51.	,, ,, ,, Fine salt	·61	nil.	·14	·95	nil.	95·23	2·68d	·39	Flack.	51
52.	,, ,, ,, Medium salt	·63	·14	nil.	·90	nil.	95·36	2·93d	·04	,,	52
53.	,, ,, ,, Coarse salt	·61	nil.	·06	·93	nil.	95·15	3·21d	·04	,,	53
54.	Port Elizabeth Saltpan Co., Fine salt	1·07	nil.	·12	·93	nil.	96·19	1·57d	·12	,,	54
55.	,, ,, Medium salt	·70	nil.	·17	·95	nil.	93·37	4·75d	·06	,,	55
56.	,, ,, Coarse salt	·50	nil.	·41	1·95	nil.	88·89	8·12d	·13	,,	56
57.	,, ,, Fine salt	·59	·17	nil.	·69	nil.	94·69	3·62d	·24	Muller.	57
58.	,, ,, Medium salt	·69	·24	nil.	1·02	nil.	93·02	4·77d	·26	,,	58
59.	,, ,, Coarse salt	·56	·08	nil.	·97	nil.	94·18	4·09d	·12	,,	59
60.	Jacobsdal Saltworks, O.R.C., Fine salt	·24	nil.	·06	·14	nil.	98·56	·86d	·14	,,	60
61.	,, ,, ,, Medium salt	·63	nil.	·21	·16	nil.	98·08	·74d	·18	,,	61
62.	,, ,, ,, Coarse salt	·51	nil.	·32	·10	nil.	98·16	·73d	·18	,,	62
63.	,, ,, ,, Fine salt	·66	nil	trace	nil.	·69	97·92	·71d	·02	Flack.	63
64.	,, ,, ,, Medium salt	·56	nil.	,,	nil.	·92	97·32	1·19d	·01	,,	64
65.	,, ,, ,, Coarse salt	·49	nil.	,,	nil.	·51	97·80	1·19d	·01	,,	65
66.	...	2·23	nil.	·70	1·32	nil.	94·69	·34d	·72	Watermeyer.	66
67.	...	·70	nil.	·90	nil.	·60	96·86	·72d	·22	Muller	67
68.	...	·85	nil.	·99	nil.	·14	95·94	1·86d	·22	,,	68
69.	...	·63	nil.	·75	nil.	·85	95·23	2·26d	·28	,,	69
70.	...	·87	nil.	·72	nil.	·66	95·94	1·64d	·17	,,	70
71.	...	·97	nil.	·51	nil.	·27	95·00	3·07d	·18	,,	71
72.	...	·92	nil.	·60	nil.	·55	95·00	2·72d	·21	,,	72
73.	...	·25	·12	nil.	·74	nil.	97·70	·06d	·23	,,	73

"d" denotes figures obtained by deducting the sum of the other percentage results from 100.

CORRESPONDENCE.

The Cape Horse.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—A great deal of adverse opinion seems to have arisen lately regarding the merits of the Thoroughbred as compared with those of the Hackney for general utility in South Africa. Having had a little—I might add successful—experience in horse breeding in South Africa, I should like to say something on the matter. At the same time it would greatly add to our little knowledge on the subject if *experienced* South African horse breeders, such as Messrs. Abe Bailey, Alex. Robertson, or C. Southey (the latter the owner of that famous horse Pearl Diver who, through his son, Camp Fire, showed them in England that we could at least breed one *good horse*), would write a few articles in your valuable *Journal* There is no doubt some Thoroughbreds are weedy, but amongst what class of animal are weeds not found?

Some of the descendants of our greatest men are, to put it mildly, weeds, yet there are hundreds of great men from great men. Again, in all the very best studs of cattle are not a *large* percentage suffering from that terrible scourge (worse than tick fever) tuberculosis? Are these not weeds in the proper sense of the word? Fortunately in the latter case there is a way of ridding your herd of these, viz., the butcher's shop, but of course this is of no use to the breeder of the equine weed.

No man (who knew his business) on being ordered to select a horse to carry him over a stiff hunting country or over a long journey to be performed in the shortest of time, would look further than Sir Daniel, Corriecrean, Ramenti, or any other horse of note on the turf, if he had such a chance of selection, and these are all horses "bred in the purple"—in other words, *Thoroughbreds.*

If horse breeders would select a Thoroughbred, *dark* of his colour, especially about the ears, legs, tail, etc. (how many pages could be written about a horse's tail?), with clean hard bone and muscles, strong back, especially the loins, and not too big a horse. This to be mated to useful mares from that very excellent old Cape strain for preference. I feel sure they would breed hacks that would be a credit to the country—in fact, an article that would carry you till he dropped (which would be a deuce of a long way), or always command a ready and remunerative sale. Horses so bred are usually intelligent and surefooted.

Hackneys are, in my humble opinion, duck-hearted and predisposed to colic or scour. They are unboubtedly too high in action for our hard, unyielding and uneven roads, and their bones being soft and light they are prone to throw out boney enlargements (splints, spavins, etc.).

Many people believe that a Thoroughbred is apt to stumble because his action is so low and straight. A *great* authority on horses says: "Stumbling is more often due to the way a horse puts his foot down on the ground than to want of height in raising the foot in action. It is rare that a horse strikes an object *in transitu.* Stumbling is far more often due to want of nervous appreciation of the obstacle or, in other words, want of delicate sensibility of touch. Some horses appear to have an intuitive appreciation of all obstacles, inequalities of ground, hollows, etc. Foremost amongst these is a horse with light easy action, who will put his foot to the ground much more easily than a sluggish or clumsy big horse. South African ponies are undeniably surefooted and as a rule have very good feet.

France and Germany—in fact, all European Governments—retain the very best judges of horses they can get to attend every sale of Thoroughbreds in England, and pay enormous sums for stallions and mares, especially those with a good turf record. All this money is spent with the object of improving the cavalry horses (remounts). Can any who take the trouble to read this article give me a single instance of a Hackney stallion or mare being bought by any of these Governments for remount purposes?

With your permission I shall forward you an article on the merits of Thoroughbreds as compared with other breeds, by Count Lhendorff, one of if not the biggest buyer in the world for cavalry purposes.

French cavalry are the best mounted soldiers in the world, and their remounts nearly all appear to have a big infusion of Thoroughbred. Not having seen them, unfortunately, I write this from books and hearsay.

To conclude, I should like to refer every man interested in this subject to a very excellent article by "Centaur," published in the *Cape Agricultural Journal* (vol. xxiii., No. 1). The above article has evidently been written by a man who was thoroughly conversant with the subject. And it is a matter of regret that there are not more men like "Centaur" in the South African horse-breeding line.—Yours, etc.,

R. PAYN.

Aloe Kop Stud, Kokstad, October 3, 1908.

Erosion and Desiccation of the Karoo.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—On a recent holiday trip that I made through several districts of the Eastern Province, O.R.C., and the Transvaal, I was painfully struck by the absence of running streams and the state of the pasturage. Everywhere, with the exception of one or two favourable localities, the country seemed to be burned up or, as is now becoming a chronic condition, was absolutely divested of grass. This was bad enough, but what helped to give it a still more barren aspect was the great bald patches, often covering from half an acre to two or three. These naked spots of sun-baked earth, with nothing to obstruct the flow of the water when at last the long-looked and hoped-for rain does come, act merely as a medium for carrying off the precious liquid to the well-cut drains Therefore, very little benefit ensues from an ordinary rain or sharp shower; on the contrary, it often does an incalculable amount of mischief by sweeping away the loosened soil. Cradock, of course, is noted for the desiccation that has long robbed her of her greatest material wealth, the soil, but I was sorry to see the great inroads that the sluits were making in the vicinity of Tarkastad, the beautiful Lessington Valley, and other parts that I visited. It is simply appalling and calls for immediate drastic and united action on the part of the Government and the people to save us from a great peril or, to put it mildly, a great national calamity; for are these terrible drains of 70 and 80 feet deep, or until they reach bed rock, not sapping the very life blood out of the country.

In all the Colonies, and particularly in mountainous regions or wherever there was a fairly steep gradient, I saw this terrible work of destruction going on, scooping out the richest and most beautiful valleys, leaving them dry and barren. I could only get a cursory view from the train, but there must have been tens of thousands—nay, I may say hundreds of thousands—of acres undergoing the process of deterioration without apparently a single effort to replant or arrest the wastage. Yes, there was an exception. Mr. R. Scott, of Waverley, on the Tarakstad line, who like another Southey was diverting the flood waters and blocking the sluits with the view to ultimate cultivation under lucerne. He has not got the area, the capital, nor the facilities, but, like Mr. Southey, on a comparatively speaking miniature scale, he has shown what brains, energy and enterprise can do in reclaiming and beautifying an otherwise unproductive piece of ground, or rather the larger proportion of it was. This beauty spot, set like an emerald in a sea of brown, ought to serve as a valuable object lesson, not only as regards the wastage of the soil but also as regards the priceless value of water in a dry season and in a dry country.

Mr. Scott has no less than eight windmills, some of them of the largest size, and pumping up to 100,000 gallons in 24 hours. All these mills have been erected by Mr. Scott himself, ingeniously connected with a system of pipes and large, well-built cement tanks, so that he has control of it and can use it at will. He has put down several other boreholes which, when he is able to erect the additional plant, will give him an abundant supply, there being practically no limit to the underground flow, which converges to a poort and is impounded by a dyke or diorite bar. Mr. Scott, who has a drilling plant of his own, studied the physical features of the country, and from its use has gained some knowledge of hydraulics which guided him in his choice of this ideal spot. Men like this, who do so much to deveolp the resources of the country, deserve to be encouraged, and one always regrets that they have not got larger means to enable them to carry out their progressive ideas

Leaving this oasis of verdure, which made the dreary wastes of the uncultivated plains all the more striking, and the thought uppermost in my mind was: could not the farmer substitute the Karoo for the more succulent lucerne by culture, care and protection. It was one of the great provisions of Nature for a dry climate; it is indigenous to the country, and this was its native habitat. Surely it would repay for the trouble and help to preserve a most invaluable fodder plant that is gradually disappearing.

When I saw the great bald spots alluded to tramped into dust, ready to be washed or blown away, Sir W. Wilcox's forcible appeal came to my mind, that we should make a special effort, not only to preserve, but to propagate this invaluable plant by sub-dividing our farms into, say, three or four compartments, for summer and winter feeding, and the third or fourth for the renovation of the good Karoo bushes and the extermination of the harmful and useless ones. Karoo farmers ought to look up this and the series of articles relating to the renovating of the Karoo and flood waters appearing in the *Agricultural Journal*, and read, mark, learn and inwardly digest the forecasts of these shrewd observers who, apart from their own practical knowledge, have brought the experience of other countries to support their theories.

In walking over a portion of a friend's farm with whom I was staying, I was very much struck with what Wilcox so strongly dilated upon: that all the good bushes were eaten to the ground, while the inferior bushes were standing whole and ready to bloom. Now it stands to reason, with the chance they get of being able to shed their seed, they must eventually crowd out the good bushes. This, he predicts, means extermination, and which also means depopulation. With the Karoo gone and the country washed into sluits, what would be its value? Walking a little further with my friend on to some cultivated land, I noticed a couple of Karoo bushes that had accidentally been enclosed growing vigorously, affording five or six times the amount of fodder that the ordinary down-trodden veld Karoo did.

This presents a valuable object lesson of what may be accomplished by care and protection. What would it cost the farmer to annually plough over a few of these barren spots and sow it with the seed of the good bushes, and, if need be, run it over with the cultivator?

We are ransacking the world in search of fodder plants upon which we bestow the greatest care and attention, such as salt bush, paspalum and other grasses, while we neglect what provident Nature has given us, and which is so eminently suited to our soil and climatic conditions, with its highly nutritious qualities and its ability to stand drought. Could we wish for anything better? Another valuable drought-resisting plant provident Nature has given us is the vaal bosch, which grows so prolifically in Taungs, Mafeking and other parts of Bechuanaland.

This or the spek boom, known as elephants' food, another of our valuable indigenous plants if planted within the fence as a hedge would provide a variety of food. I don't know much about the vaal bosch beyond that I visited these parts in an extremely dry season when there was practically no other vegetation about, and my oxen retained their condition and remained in good heart during the period of my stay of three weeks. Judging from this and what I could learn of its feeding qualities it is eminently adapted to a dry climate and ought to be more widely distributed. One of the properties of the spek boom is that it contains water as well as food, and sheep that entirely subsisted upon it in the early days——when, like the karoo, it was more abundant—could, I am told, dispense with water.

The only question is, would it thrive in the Karoo? If so, it would be a perfect god-send to this desolate and waterless region. I refer now more particularly to the more arid parts like the Gouph, Prince Albert, etc., which, if not already a desert, is rapidly fulfilling Wilcox's prophecy of becoming one by the disappearance of its most valued shrubs and succulent plants. One can hardly realise that within 60 miles of the beautiful metropolis of the Cape Colony a howling wilderness of some hundreds of square miles exists which requires many thousands of acres to supply a single family with the bare necessaries of life.

Mr. Wilcox, who made it his business as a Government expert, to inquire into the matter, and upon which he founds his report, says it takes eight acres in some parts of the Karoo to support one sheep, but goes on to say if proper methods were adopted of preservation it would probably be possible to feed three sheep where one is fed to-day. Mr. Gordon, Mr. Kanthack, and other authorities, with the same emphatic language, have again and again reiterated these statements, pointing to the inevitable ruin that awaits us unless we as a people and in a truly national spirit are prepared to grapple with this great and threatened danger which hangs over us. Or are we going to allow these unfortunates to gradually sink deeper into poverty like the once prosperous inhabitants of the Libyan Desert are sunk, by the all-devouring sand storms of the newly-created South African Desert as a monument of our apathy and indifference.

People may think this a highly imaginary picture, but the writer actually saw evidence of this in his recent travels in the shape of one or two considerable sand dunes. Others were in course of formation by the riplets or waves of sand, which here and there were distinctly visible from the road. These were evidently blown up from higher levels of the Stormberg or the foot hills of these ranges, which are very much broken up and denuded by overstocking and our criminal carelessness. Only forty years ago these parts, which were known to the writer from his long residence there, as heavily grassed and watered by vleis, as succulent pasturage. Now dry gullies with an occasional tuft of this water grass is all that is left standing amid the wreckage to tell of its past glories and man's destructive proclivities. These destructive propensities are admirably dealt with by Mr. Kanthack in his able and very instructive article in the *Agricultural Journal* of August, entitled "Destruction of Mountain Vegetation," but which only came under my notice since writing the foregoing.

Having already taken up so much of your space, however desirous I may be, I cannot dwell upon the great lesson it teaches, but was impressed by the very drastic measures undertaken by the Indian Government to stop erosion which shows that they regard it as a matter of great national importance. About thirty years ago the Wodehouse Farmers' Association passed a strong resolution asking the Government to take some steps, but beyond sending a forest officer to investigate nothing was done. Though, as I have tried to point out, we have had the most faithful warnings of the dire consequences that must eventually ensue if the warnings are neglected. If in the short space of forty or fifty years the deterioration of the country has been so great, what must we expect in a decade or two if similar action is not taken?

What often surprises me is that in the purchase of a farm property men will pay as much as five and six hundred pounds included in the purchase price for land absolutely rendered intrinsically valueless by this process of erosion. Yet they will not spend a five pound note in trying to stop its further progress. So many suggestions have been made how this may be done by practical men, I will not stop to discuss it here. But with the knowledge that we are annually getting more and more into the grip of poverty by the loss of our most valuable and precious assets the soil and water, are we not justified in calling up the shades of mighty nations from the dim and misty past as examples of folly and neglect in disobeying the inexorable laws of Nature in this respect, who, Professor Sully says in his splendid paper in the *Agricultural Journal* of 31st October, 1899, left these monuments of their prosperity in the sand. As he has put it far more forcibly and graphically than I can attempt to do, I shall leave your readers to digest it and, I hope, profit by it.—Yours, etc.,

E. R. BRADFIELD.

Rondebosch, October 12, 1908.

Arsenate of Lead as a Remedy Against Calandra Beetles.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Kindly let the following appear in the *Journal*, in connection with my letter in the January issue, and also in compliance to the request of Mr. R. W. Jack, to hear the results of more experiments with arsenate of lead for the "Calandra" beetle.

As I wrote at the time, I had a good result from spraying the vines infested by calandras, with arsenate of lead in October, 1907. All not having been killed by spraying with 3 lbs. to 50 gallons water, in early March, 1908, in my opinion I killed all of them with a spray of 3 lbs. to 36 gallons water. Not only did they disappear then and there, but also this year they made no appearance at all, although these little fiends were very troublesome during the last three years. I can assure you that in one catch I caught up to 134 on vine sticks with shoots, not longer than my fingers. Frankly, I can recommend this treatment to those who have to combat calandra beetles. Thanking you in anticipation.—Yours, etc.,

C. L. DE JONGH.

Achter Paarl, 13 October, 1908.

Farmers and Forest Trees.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—The effect of forests on the atmosphere as regards rainfall having been so over and over proved to us, I am surprised that we farmers have not yet been compelled through legislation to plant trees instead of destroying, especially in districts throughout the Colony, where grain has taken the place of nature's wild bush and tree, and nothing is being done to replace (with forest trees) one to ten thousand morgen. Mountain veld is also getting as barren as the flats by burning away grass, trees and if possible the rocks also. This evil is practically impossible to stop unless it is done by an act of parliament. If our farmer burns his Mountain veld, and his neighbour does not burn, this poor neighbour will have a job to keep his stock on his own ground, as the burnt veld will give nice soft sweet grass, and the unburnt will be hard, sour and stalky. Now the right step would be to punish us for the welfare of our children. The easiest and cheapest way would be, in my opinion, that to every 300 morgen at least one morgen should be planted with forest trees of any kind most suitable for that locality. We will name the eucalyptus, which ought to be planted about 10 feet apart or 900 to the morgen for localities of a dry atmosphere. I do not know of one single farm in which, "with a little extra care," a few morgen of land, forest trees of some kind cannot be grown.

The farmer, being the backbone of the country, can do with a little assistance, especially when he is indirectly benefitting all, from the chief justice down to the chimney sweep, as well as himself, by planting and cultivating perhaps some thousands of trees. This proposed help can come from Government in this manner, viz., Government appoints some nursery man in a district, where there is no Government plantation, who by contract has to supply farmers with tree plants at say £1 per 1,000. The fencing material could also be shared, Government paying half, like in case of the cost of trees.

Then the fieldcornets can inspect such plantations and from time to time report to Government the successes and failures and the causes, etc. I fully believe this plan of mine will be adopted and that the time is not far off, and if it once becomes law that the act will not be made permissive and be a dead letter.—Yours faithfully,

R. P. MALAN.

Monte Cristo, October 25, 1908.

The Classification of Merino Sheep.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Will you kindly allow me space to make a few remarks on the letters which appeared in the last issue of your *Journal,* written by Mr. R. Pell Edmonds and Mr. C. C. Vermaak.

Both writers disagree with the wisdom of the decision arrived at by the Committee appointed by the Agricultural Union in recommending the classifying of sheep at shows under the heads of the three principal breeds, viz., Australian-Tasmanian, Rambouillet, and Vermont. Mr. Edmonds agrees that the present classification of sheep is wrong and gives as one of his reasons, that a large number of medium woolled sheep can compete in either the robust or finewoolled classes. The natural inference in regard to this objection is that Mr. Edwards thinks that the line of demarcation is not sufficiently clear between the two classes. But, in the classification, which Mr. Edmonds says be recommended to the Secretary of the Rosebank Show, viz., Class A, Merino sheep bred principally for wool, Class B, Merino sheep bred for wool and carcase—where would he draw the line between the two classes? And at exactly what point in defection or smallness of carcase, and perfection of wool, would a sheep cease to be a sheep bred for both wool and carcase and qualify for the class for sheep bred principally for wool? And *vice versa?*

As regards Mr. Vermaak's objection to the finding of the Committee, which reads: "That the present system in vogue at shows tends to the crossing of the various distinct types of sheep, producing animals of no fixed type at all, but merely a "show" sheep." Mr. Vermaak, though not an advocate of crossing different fixed types indiscriminately and aimlessly, still seems to think that

crossing judiciously might produce a sheep more suitable to the requirements of the Country. Quite true. And I have no doubt that many men are building up a good class of sheep by wise and careful crossing and selection. But there is one point not to be lost sight of, and that is, that there has been for some time past a vast amount of indiscriminate crossing of totally different types of sheep, resulting in the "Made" sheep. And I maintain that the "Made" sheep—that is—a sheep bred from directly different types (the cross most common being that between very heavy woolled Vermont rams and light woolled plain bodied ewes), is a distinct danger to the permanent improvement of the flocks of South Africa, in as much as, that the result of the cross—the "Made sheep" is very often a model animal, and is attractive enough to command big prices and ready purchasers who think that these sheep are going to reproduce themselves and give them good stock. But in many, and I may say in most cases, the progeny is a failure; often inheriting the worst characteristics of the sire's dam and sire, and very few of their good ones. Whereas, in the case of a man breeding from a good ram of a distinct and good breed, he would know that the progeny would be good, and that the ram would have the power to stamp his good qualities on to his stock.

In conclusion I should like to say that it seems to be generally believed that the finding of the Committee, which has been accepted by the Agricultural Union and by them forwarded to the different agricultural societies, recommending the classification of sheep at shows under the heads of Australian-Tasmanian, Rambouillet, and Vermont, means that all sheep, exhibited at shows, which are not distinctly pure of the above breeds, will be disqualified. I may be wrong, but I take it, Mr. Editor, that the meaning of the recommendation is that agricultural societies shall try to encourage these breeds,—not by disqualifying any that may not be quite pure,—but by classifying any sheep that are exhibited as nearly as possible under these heads.

Mr. Edmonds justly remarks that with curtailment of entries comes curtailment of interest, and I should think that all agricultural societies should encourage as large a competition of good sheep as possible; as it will take many years before only the distinct and pure breeds of sheep (be they the three breeds already recommended or any new breed that may be made to suit the special requirements of this country, and bred sufficiently long to one type to be considered pure) shall be deemed sufficient to meet the case.—Yours, etc.,

P. E. Leonard.

"Glen Dower," Kokstad, 2nd October, 1908.

Sheep Dips and Depots.

To the Editor, Agricultural Journal.

Sir,—Messrs. Cooper and Nephew's letter in your October number contains a defence of the Government Depôt system which comes late in the day; but, at the same time, they indicate the reductions which have taken place in the price of their dip may go still further. I should say that if the results of those experiments recently made known to you under the heading of "The Great Dip Controversy" count for anything, the prices of both Cooper's Powder and "Arrow" Brand Nicotine Dip must come down to the same level as lime and sulphur. I am no believer in lime and sulphur as a suitable dip to bring into contact with wool, and yet, upon carefully reading Mr. Hollings' reports, I am inclined to say most men would judge that, so far as effects upon wool for scouring and dyeing are concerned, neither the "Yellow Powder" nor "Arrow Brand" have any grounds now for crowing over lime and sulphur.

But why were carbolic dips not also tested? There is a lot of them used in South Africa, and one would like to know in what respect they affect the wool for manufacturing processes. My son (who manages my farm now) tells me there is much confusion as to what strength they should be used at. One brand hardly cures scab when mixed at double its advertised strength, while another, although effective enough when used as directed, requires a healthy sheep to stand it. A concentrated dip may be a fault on the right side, but the Agricultural Department might do worse than issue a list of safe dipping strengths at which the various dips may be relied upon to cure scab. Farmers in other countries seem to have such particulars published, and we too might benefit by the information. There is no wisdom in the Government recommending any dip—whether manufactured or not. All they need do—since dips are chemicals—is to let farmers know in a general way their composition and scab-killing powers. Then leave us to make our choice under constraint of a heavy fine if we don't keep our flocks clean.

As regards the Dip Depôt system, I did not find it of any service. When I was struggling and had to buy on credit, it was years before the cash price the Government arranged with the dip firms was available for me. There must always be thousands as I was then, and I cannot believe the intention of Parliament was to restrict prices for the well-to-do only. My storekeeper told me he could not sell so cheaply as the depôt agent because the latter had an extra commission from Government; and when I went to the depôt the agent wanted to push on to me some fancy of his own which I have since learned was probably because the dip firm owning it gave him the largest discount. And what does all this cry about free carriage amount to? A dip-man assured me the other day that on the dips his firm send away the railage is only a trifling 3d. per gallon for an average distance.

What exactly caused the high prices of dips *before* the depôts as compared with what they became *under* the depôts, and whether Messrs. Cooper correctly ascribe the lowering of these to the inauguration of the system in question need not be enquired into now, because in the keen competition there has grown up amongst the dip firms (which your correspondents are doubtless feeling in common with others), an explanation of why dips are cheaper presents itself, which, to most minds, renders debate superfluous.—Yours, etc.,

HAND-DRESSER.

28th October, 1908.

To Destroy Mice and Porcupines.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I see Mr. J. J. Botha would like to get rid of his mice and porcupines. Take a cake of hard fat, melt it in a flat-bottomed pan; then put in a lot of ground poison and sugar, or arsenic and sugar; and stir it well and allow it to get cold. Then break this up and cut little pieces of a quarter of an inch square and drop it into the walls or hedges, so as to be out of the way of dogs and cats. Jackal-traps are the only way of destroying porcupines that I know of.—Yours, etc.,

AUSTEN JACKSON.

Carnarvon, October 11.

The Divining Rod.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I see a Mr. Classens, of Victoria West, writes how to hold the rod. I would like to see him use it the way he describes. What, I presume, he means is, hold an end in each hand, which is correct. I have three bore-holes and a well, all first tested with the rod. All have water. In our parts we all try the rod before boring.—Yours, etc.,

AUSTEN JACKSON.

Carnarvon, October 11.

The Question of Dips.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I note with pleasure that the Government has gone to the trouble and expense of testing the three different kinds of dips, a report of which appears in the September number of the *Journal*. From this it appears that all dips damage the wool to a certain extent. I am only sorry that lime and sulphur has not had quite a fair trial against Cooper's Dip. According to the report Cooper's Dip is to be

mixed 1 packet to 25 gallons of water, whereas in the test of the most importance – *i.e.*, three months and six months—it was only made 3 packets to 100 gallons. My experience is that Cooper's Dip only becomes a fairly decent dip when you add four extra packets to a dip of 900 gallons. As regards lime and sulphur, I have used that dip for years, and only make it 18 lbs. of lime and 20 lbs. of sulphur, and find it better than any of the patent dips. Unfortunately, in our parts there is so much trekking with scabby flocks that it is almost impossible to keep sheep clean for more than a year at a stretch. My opinion is that if people would use lime and sulphur properly, and make a determined effort to burn out their old kraals, in a couple of years our country would be rid of scab, and we would not have to damage our wool by the use of all these different dips. If the fines were increased to fifty pounds instead of two and 10s., people would not buy sheep out of scabby flocks, which often happens. In these parts, which are subject to severe droughts, there are grievances, but not nearly as bad as is generally supposed. One of the biggest reasons that scab is so bad in these parst is that people just throw in the sheep and let them swim through and then straight back to the old "nests.". The consequence is the sheep only are in the dip for about a quarter or half a minute.—Yours, etc.,

AUSTEN JACKSON.

Carnarvon District.

APPLICATIONS FOR AGRICULTURAL EMPLOYMENT.

Youth, inexperienced, now in England, is desirous of obtaining employment on a farm in this Colony. Reply to A. PEARSON, 13. De Lorentz Street. Cape Town.

Employment on a stock farm wanted for the purpose of learning. Willing to be apprenticed. Reply E. S. ABBOTT, P.O. Box 255, Cape Town.

Elsenberg student shortly leaving college, having completed his course, is desirous of employment as under-manager on a good stock farm within about 100 miles of Cape Town. Would accept a small salary. Speaks Dutch fluently. About 19, strong, healthy and not afraid of hard work. Reply IVOR J. EDWARDS, Elsenberg Agricultural College, Mulder's Vlei.

Elsenberg student, completing full course at end of session. desires employment on a farm (ostrich farm preferred). Would accept a small salary as a beginning. Reply HERBERT WOOF, Elsenberg Agricultural College, Mulder's Vlei.

Elsenberg student, completing full course at the end of the year, seeks employment on farm. Fruit or dairying preferred if possible. Reply RICHARD B. COOK, Elsenberg Agricultural College, Mulder's Vlei.

E. S. Meadows, of Templestowe, Mowbray, is desirous of obtaining employment on any farm. Is willing to give his services in exchange for board and lodging for a reasonable period.

NOTES ON THE WEATHER OF SEPTEMBER, 1908.

By THOMAS W. REES, B.A., LL.M., Assistant Secretary to the Meteorological Commission.

A mean atmospheric pressure slightly above the average, an almost normal monthly mean temperature, a continued deficiency of rainfall, a few falls of snow, a mean cloudiness more than usual, several severe shocks of earthquake—for this part of the globe, at any rate—were the most noticeable features of the weather of September.

DIVISION.	Mean Rainfall (1908).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	2·87	7	3·55	10	—0·68	— 19
South-West ...	1·28	4	1·99	6	—0·71	— 36
West Coast ...	0·39	3	0·74	4	—0·35	— 47
South Coast ...	1·38	6	2·26	7	—0·88	— 39
Southern Karoo ...	0·33	2	0·83	3	—0·50	— 60
West Central Karoo ...	0·34	1	0·53	2	—0·19	— 36
East Central Karoo ...	0·77	3	0·96	2	—0·19	— 20
Northern Karoo ...	0·43	2	0·42	2	+0·01	— 2
Northern Border ...	0·67	2	0·15	1	+0·52	+346
South-East ...	2·13	6	2·14	6	—0·01	...
North-East ...	0·78	5	0·99	3	—0·21	— 21
Kaffraria ...	1·71	8	2·05	5	—0·34	— 17
Basutoland ...	2·49	8	1·22	4	+1·27	+104
Orange River Colony...	...	...	0·73	2	...	...
Durban (Natal) ...	1·62	10	3·49	...	—1·87	— 54
Bechuanaland ...	1·45	2	0·40	1	+1·05	+262
Rhodesia ...	0·01	1	0·16	1	—0·15	— 94

Precipitation.—The mean rainfall for September, deducted from the records of 351 stations amounted to 1·32 ins., falling on 5 days, being 0·35 ins., or 21 per cent. less than the average. The deficiency was general with the exception of the Northern Border, Bechuanaland and Basutoland. The deficiency was greatest over Rhodesia (94 per cent.), the Southern Karoo (60 per cent.), Durban (54 per cent.) and the West Coast (47 per cent.). The deficiency—where there was such—averaged 37 per cent. The excess of rainfall was greatest over the Northern Border (346 per cent.); then follow Bechuanaland (262 per cent.) and Basutoland (104 per cent.). Absolute drought prevailed throughout the month at only 7 of the 351 stations, although partial drought (0·01—0·50 ins.) affected an additional 84 stations. Of the remainder, 83 had 0·51—1 in.; 101 had 1·01—2 ins.; 49 had 2·01—3 ins.; 15 had 3·01—4 ins.; 7 had 4·01—5 ins.; whilst 5 had over 5 inches, these being Chiselhurst (East London), with 5·95 ins.; St. Michael's, Waai Koppje and Maclear's (all on Table Mountain), with 5·60 ins., 5·40 ins. and 5·20 ins. respectively, and Newlands (Cape) with 5·03 ins. The maximum amounts recorded in 24 hours were generally very small. Of the 343 stations rendering the necessary data and excluding the 7 having "Nil," 159 had

0·01—0·50 in.; 123 had 0·51—1 in.; 52 had 1·01—2 ins.; whilst 2 only had over 2 ins., viz., Newlands (Cape), 2·31 ins., on the 13th, and Armadillo Creek (Vryburg), 2·03, on the 23rd. *Thunderstorms* were more numerous than in the previous month, 122 cases in all being noted as occurring on 20 days, chiefly on the 2nd, 13th, 14th and 23rd. *Hail* fell at 13 stations on 7 days. No damage seems to have occurred through any of these. *Sleet* was noted at 7 stations on 6 days. *Snow* fell at Hotweg Kloof (Cradock) and at Maclear on the 11th, and at Zwartberg Pass on the 20th; at the latter place the ground was wholly covered.

Temperature, Cloud and Wind.—The mean temperature of all stations was 58·3°, which is only 0·05° higher than the average. The mean maximum (69·3°) was 0·07° lower, and the mean minimum (47·3°) 1·8° higher than the average. The mean warmest station was Hope Fountain with a temperature of 69·6°, and the mean coldest Port Nolloth with 51·8°, a difference of 17·8°. The highest mean maximum was 84·2°, also at Hope Fountain, and the lowest mean maximum 58·7° at Devil's Peak (Table Mountain). The highest mean minimum was 56·9° at Port St. John's, and the lowest mean minimum 34·5° at Hanover. The mean of the highest readings was 83·0°, this being 5·9° colder than in September last year, and only 1·8° warmer than in August last; the mean of the lowest readings was 37·7°, or 2·3° higher than in the same month last year. The mean monthly range was therefore 45·3°. The highest temperatures recorded for the month were 95·6° at Dunbrody, on the 17th; 95·5° at King William's Town, on the 21st; 95·0° at Umtata, on the 27th; 93·0° at Stutterheim, also on the 27th; and 92·1° at Kimberley, on the 10th. The lowest temperatures noted for the month were 24·0° at Hanover, on the 2nd; 26·0° at Hopetown, on the 8th; 27·0° at Murraysburg, on the 20th; 29·0° at Aliwal North, on the 1st; and 29·9° at Cathcart, on the 22nd. The extreme monthly range over all stations was 71·6°, which is 9·9° less than in the corresponding month of last year. The days during the month were colder than usual, whilst the nights were considerably warmer. The warmest days were the 10th, 11th, 17th, 19th and 27th; and the coldest mornings those of the 21st, 22nd, 23rd, 25th, 28th and 29th. *Frosts* were reported from 63 stations on 18 days, more particularly on the 20th and the 21st. Some of these were severe, especially at The Oakes (Ceres), on the 29th: Prince Albert, on the 23rd; Cradock, on the 20th; Theefontein (Hanover), on the 21st and 22nd; Douglas, on the 22nd (fruit trees damaged); Aliwal North, on the 21st; Lauriston (Barkly East), on the 22nd; and Maclear, on the 23rd.

The mean amount of *Cloud* was 49 per cent., this being 6 per cent. more than in the previous month. The sky was most obscured over Kaffraria, the South Coast and the South-East. It was clearest over Rhodesia, the West Coast, the Northern Karoo, the South-West and the Northern Border. The sky was most obscured at Port St. John's (71 per cent.), and least at O'okiep (14 per cent.). The mean *Wind-force* on the Beaufort Scale (1—12) was 1·81, corresponding to a mean velocity of 12 miles per hour. The wind was strongest along the South Coast, the South-West and the Cape Peninsula, and of least force over the Southern Karoo and the Northern Karoo. The prevailing morning winds were South-Easterly at Port Nolloth, and the Cape Peninsula, and thence Westerly along the coast as far as Port St. John's, and at Durban South-Westerly. In the interior the winds were Northerly at O'okiep, Easterly at Murraysburg, and Main; South-Easterly at Bedford, Aliwal North, Queenstown and Umtata; North-Westerly at Cathcart and Rietfontein (Aliwal North), and North-Easterly at Kimberley. *Gales* were hardly as frequent as usual, being only reported from 32 stations on 14 days, by far the greater number occurring on the 27th. No damage seems to have been done by any of these. *Hot Winds* were experienced at 7 stations on 4 days, and *Duststorms* at three on 2 days. Six *Earthquake* shocks were felt in different parts of the Colony on the 26th, and one more on the 29th. Those on the 26th occurred at the following places, viz., New Bethesda (Graaff-Reinet), Schuilhoek (Hanover), Barkly East, Douglas, Newlands (Barkly West) and Hopetown. That on the 29th occurred at Kokstad. The shock appears to have been travelling from West to East. Mr. Voss, of Douglas, states that the shock was first felt at 11.10 p.m.—the doors rattled and the beds were felt to shake for at least 16 seconds. Dr. Gadow, of Hopetown, has kindly sent me the following:—"I was sitting reading in my dining room, on the 26th, when exactly at 10.59 p.m. I noticed a 4—6 seconds' lasting shake which made the hanging-lamp swing and the glass doors to passage and verandah click. I thought first that one of the season's usual duststorms was starting, but the attitude of the two animals with me in the room—a dog and a cat, suddenly jumping up with all symptoms of fear—startled me, when exactly 11 o'clock a second shock or rather a 10—12 seconds lasting series of four shakes followed. The second one of this series was of great vehemence, accompanied by a loud rolling, and causing such a tottering of the whole (stone-built) house that the stucco fell down from walls and ceilings, the furniture tottered about and the lamps started swinging in a vehement manner. I had the distinct impression that the direction of the shocks was from South, or rather between S. and S.S.W. to North, viz., between N. and N.N.E."

OBSERVERS' NOTES.

VRUCHTBAAR (Wellington).—Fruit trees in full bloom and very promising for good crops of nearly all kinds of fruit.

NEW BETHESDA (Graaff-Reinet).—On August 30th, a terrific gale. Much wind also this month. Some days bitterly cold, especially on the 20th, when severe frost did much damage to fruit and gardens. Sever earthquake shock at 11 p.m. on Saturday, the 26th, apparently travelling from W. to E. Strange oscillatory movement of the earth, with deep rumbling noise. Houses shook.

THEEFONTEIN (Hanover).—Sharp frost on 1st, 21st and 22nd, the two latter killing fruit blossoms. Fog on 29th. Winds, light and variable, mainly between N. and W. Many cloudy days.

HUXLEY FARM (Stutterheim).—All is well. Plenty of green grass for stock, and farmers all busy planting their summer crops.

ALIWAL NORTH.—The frost on the 21st did a lot of harm to young fruit in town and district. It seems from general reports that the frost was severe also on the outskirts of the town.

BOLOTWA (Queenstown).—The drought has become very serious.

CASTLE HILL (Aliwal North).—Flying locusts have made their appearance here again, though not in very great numbers. They seem to have come from the North-West with the prevailing winds.

SUNNYMEADE (Albert).—The weather has been very changeable, although stock improving slowly.

VENTERSTAD.—Several frosts during the month. Rain badly needed

KOKSTAD.—Beautiful rains the latter part of the month. Veldt beginning to look green.

ARMADILLO CREEK (Vryburg).—A good deal of wind, chiefly from the West. Rain badly wanted. High grass still plentiful. Weather mild; no frost. Heavy hailstorms are reported to the South-East, and hundreds of sheep and goats died. Vivid lightning was constant far to the West; apparently in the centre of the Kalahari Desert.

GROOT DRAKENSTEIN (Paarl).—Mean temperature 1·4° below avera_e of 9 years. Rainfall 0·83 in. below average of 15 years.

KOKSTAD.—Several fiercely hot winds minimised the good effect of the rains in the early part of the month, but a nice soaking rain closed the month. No frost. Fruit and grass well advanced. Some cases of scarlet fever and influenza in town. Two shocks of earthquake were felt, on the afternoons of the 5th and 29th, the latter rather severe, shaking the buildings.

CARNARVON FARM.—This has been the most unlucky, if not one of the most unpleasant, Septembers I have ever experienced. Crops (non-irrigable) that were put in with this June rain are for the most part so dwindled down by wind, drought and severe frost that in many cases these lands will be ploughed up for mealies, and these will fail if the weather does does not become more favourable. Stock that stood the winter well are now dying; no veldt, and water scarce.

The severe frosts of the 21st (9 degrees) killed all small late buds, potatoes and mealies.

Year.	Rain.	Wind.	Frosts.	Cloudless. Days.
1901	2·25	10	2	0
1902	1·08	20	4	1
1903	0·00	13	11	3
1904	0·38	20	10	4
1905	3·35	6	10	0
1906	1·94	8	6	3
1907	0·85	10	5	4
1908	0·43	11	6	3

It will be seen from above table that the number of cloudless days is above the average. Frosts and winds are also above the average for 8 years, while rain is considerably below the 8 year average.

TEMPERATURE, SEPTEMBER, 1908.

Stations.	Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory ...	61·7	50·7	56·2	72·0	13	41·0	29
Cape Town (City Hospital) ...	63·8	49·6	56·7	71·0	24	44·2	29
" (S.A.C.) ...	65·8	47·4	56·6	74·5	24	41·0	9
Wynberg ...	65·2	48·3	56·8	74·5	25	40·0	29
Bishopscourt ...	64·5	50·7	57·6	72·0	25	43·0	8
Devil's Peak ...	58·7	48·3	53·5	78·0	16	41·0	20
Groot Constantia ...	62·9	48·1	55·5	71·0	25	43·0	28, 29 & 30
Blaauwberg ...	62·9	50·1	56·5	68·5	16	43·0	29
Elsenberg (Agri. College) ...	65·7	42·1	53·9	76·9	16	36·0	22
Ceres ...	70·3	42·9	56·6	74·0	3 & 4	38·0	28, 29 & 30
Robertson (Plantation) ...	71·0	43·5	57·2	85·0	25	34·0	28
Danger Point ...	60·7	51·1	55·9	64·0	27	44·0	1
Groot Drakenstein ...	67·9	45·9	56·9	84·6	16	38·3	29
O'kiep ...	72·6	45·3	58·5	86·4	9	34·0	21
Port Nolloth ...	59·4	44·2	51·8	75·0	13	38·5	7
Port Elizabeth ...	66·0	52·4	59·2	74·0	17	46·0	21
Uitenhage ...	72·5	47·9	60·2	91·0	25	39·0	23
Cape Agulhas ...	61·8	51·1	56·4	68·0	18	44·0	22
Cape St. Francis ...	64·4	50·3	57·4	69·0	17, 25 & 26	46·0	2
Van Staaden's ...	66·2	48·7	57·4	82·0	18	41·0	2
Dunbrody ...	74·1	46·3	60·2	95·6	17	30·5	22
Mossel Bay ...	65·2	50·0	57·6	74·0	18	44·0	22 & 23
Heidelberg ...	73·1	44·4	58·8	87·0	17	35·0	22
Concordia (Plantation) ...	65·1	49·3	57·2	89·7	17	42·8	22
George (Plantation) ...	64·9	47·6	56·2	88·0	17	41·0	22
Amalienstein ...	73·7	43·1	58·4	92·0	17	32·0	21 & 22
Murraysburg ...	71·2	41·3	56·2	85·0	17	27·0	20
Hanover ...	74·2	34·5	54·3	83·0	10, 11 & 19	24·0	2
Kimberley ...	81·5	48·4	65·0	92·1	10	37·9	22
Hope Town ...	78·9	45·3	62·1	90·0	9 & 27	26·0	8
Lovedale ...	71·4	48·4	59·9	90·0	8 & 26	37·0	22
Stutterheim ...	69·7	47·3	58·5	93·0	27	35·2	22
Sydney's Hope ...	66·2	47·9	57·0	85·2	25	39·0	22
Bedford ...	70·7	45·5	58·1	90·0	18	34·0	21
King William's Town ...	72·8	48·3	60·6	95·5	26	37·0	21
Cathcart ...	67·5	43·2	55·3	85·1	27	29·9	22
East London ...	68·1	55·2	61.6	74·0	27	48·0	22
Rietfontein (Aliwal North) ...	69·0	40·7	54·9	80·4	27	30·5	1
Aliwal North ...	74·0	42·0	58·0	85·0	10 & 27	29·0	1
Queenstown ...	73·7	46·8	60·2	89·0	10 & 27	31·0	21 & 22
Kokstad ...	71·3	45·2	58·3	87·1	27	37·0	25
Port St. John's ...	71·8	56·9	64·4	90·0	27	42·0	21
Umtata ...	72·1	48·8	60·4	95·0	27	35·0	22
Mount Ayliff ...	73·9	51·2	62·6	92·0	27	37·0	22
Tabankulu ...	69·9	48·3	59·1	87·5	10 & 27	40·0	12
Main ...	71·5	48·8	60·2	92·0	27	35·5	21
Teyateyaneng ...	72·8	44·6	58·7	83·0	19	32·0	22
Kuruman ...	80·5	43·3	61·9	86·0	19	32·0	25
Hop Fountain ...	84·2	55·1	69·6	92·0	29	49·0	3 & 5
Means ...	69·3	47·3	58·3	83·0	...	37·7	...
Extremes ...	...	...	...	95·6	17	24·0	2

RAINFALL, SEPTEMBER, 1908

I. CAPE PENINSULA:	INS.
Royal Observatory (*a*) 12 in. gauge	1·77
Cape Town, Fire Station	1·67
Do. South African College	2·01
Do. Molteno Reservoir	
Do. Platteklip	
Do. Signal Hill	1·88
Do. Hospital	2.11
Sea Point, The Hall	1·74
Do. Attridge	
Camp's Bay	1·42
Table Mountain Disa Head	
Do. Kasteel Poort	
Do. Waai Kopje	
Do. St. Michael's	
Devil's Peak Blockhouse	3·45
Do. Nursery	3·18
Do. Lower Gauge	
Woodstock, The Hall	1·98
Do. Municipal Quarry	2·91
Do. do. Nipher's Shield	3·27
Newlands, Montebello	5·03
Claremont, Carrigeen	
Bishopscourt	3·79
Kenilworth	3·60
Wynberg, St. Mary's	2·68
Groot Constantia	3·62
Tokai Plantation	2·13
Plumstead, Culmwood	1·97
Muizenburg (St. Res.)	3·71
Fish Hoek	
Simon's Town, Wood	
Do. Gaol	
Cape Point	0·67
Blaauwberg Strand	
Robben Island	1·38
Durbanville	
Maitland Cemetery	1·71
Tamboers Kloof	1·85

II. SOUTH-WEST:	INS.
Eerste River	1·50
Klapmuts	2·42
Stellenbosch, Gaol	2·83
Somerset West	2·10
Paarl	1·54
Wellington, Gaol	1·29
Do. Huguenot Seminary	
Groot Drakenstein, Weltevreden	2·18
Porterville Road	0·69
Tulbagh	0·48
Ceres Road	0·94
Kluitjes Kraal	
Ceres	1·66
The Oaks	0·54
Rawsonville	0·45
Caledon	2·13
Worcester, Gaol	0·29
,, Meiring	
,, Station	
Hex Rivier	0·11
De Doorns	0·13

II. SOUTH-WEST (*continued*):	INS.
Karnmelks River	
Lady Grey, Div. Robertson	
Robertson, Gaol	0·37
Do. Govt. Plantation	0·30
De Hoop	
Montagu	0·25
Danger Point	0·77
Vygebooms River	2·05
Elgin Plantation	2·72
Elsenberg Agricultural College	2·20
Berg River Hoek	
Wemmer's Hoek	
Roskeen	1·72
Vruchtbaar	1·80

III. WEST COAST:	INS.
Port Nolloth	0·00
Do. (Lieut. Barber)	
Anenous	0·18
Klipfontein	0·16
Kraaifontein	0·30
O'okiep	0·15
Springbokfontein	0·31
Concordia	
Do. (Kraphol)	0·13
Garies	0·11
Lilyfontein	0 31
Van Rhyn's Dorp	0·08
Clanwilliam, Gaol	0·08
Do. (Downes)	
Dassen Island	1·19
Kersefontein	0·48
The Towers	0.46
Abbotsdale	1·17
Malmesbury	0·83
Piquetberg	0·57
Zoutpan	
Wupperthal	0·00
Welbedacht	
Algeria (Clanwilliam)	0·64
Cedarberg (do.)	0·66

IV. SOUTH COAST:	INS.
Cape Agulhas	0·59
Bredasdorp	1·19
Swellendam	0·99
Potberg	
Zuurbraak	1·69
Grootvaders Bosch	3·20
Heidelberg	0·43
Riversdale	0·45
Melkhoutfontein	
Vogel Vlei	0·00
Geelbek's Vlei	
Mossel Bay	0·35
Great Brak River	0·51
George	1·98
Do. (Plantation)	1·96
Woodifield (George)	2·00
Eseljagt	
Millwood	1·83

IV. SOUTH COAST (*con.*) :

	INS.
Sourflats	1·30
Concordia	2.24
Knysna	1·14
Buffel's Nek	2·21
Plettenberg Bay	0·94
Harkerville	2·28
Forest Hall	...
Blaauwkrantz	2·17
Lottering	...
Storms River	...
Witte Els Bosch	2·63
Humansdorp	0·75
Cape St. Francis	0·33
Hankey	...
Witteklip, Sunnyside	1·71
Van Staden's, Intake	1·17
Do. On Hill	2·15
Kruis River	1·28
Uitenhage (Gaol)	1·16
Do. (Park)	1·27
Do. (Inggs)	1·15
Armadale (Blue Cliff)	0·98
Dunbrody	0·84
Port Elizabeth (Harbour)	0·80
Do. (Victoria Park)	
Do. (Walmer Heights)	
Shark's River (Nursery)	...
Do. (Convict Station)	0·99
Tankatara	...
Centlivres	...
Edinburgh (Knysna)	1·50

V. SOUTHERN KAROO :

	INS.
Verkeerde Vlei	...
Bok River	...
Triangle	...
Touws River	...
Do. (D.E. Office)	...
Pietermeintjes	...
Grootfontein	...
Ladismith	0·55
Amalienstein	0·51
Seven Weeks' Poort	...
Calitzdorp	0·14
Oudtshoorn	0·00
Vlakte Farm	...
Uniondale	0·05
Kleinpoort	0·72
Glenconnor	...
Rust en Vrede	...

VI. WEST-CENTRAL KAROO :

	INS.
Matjesfontein	...
Laingsburg	...
Prince Albert Road	...
Fraserburg Road	...
Prince Albert	0·03
Zwartberg Pass	1·66
Booi's Kraal, Beaufort West	...
Beaufort West, Gaol	0·12
Dunedin	0·54
Nel's Poort	0·34
Camfers Kraal	0·19
Lower Nel's Poort	...
Krom River	0·55
Baaken's Rug	0·17
Willowmore	...
Rietfontein	...
Steytlerville	...
Lemoenfontein (Beaufort West)	0·30

VII. EAST-CENTRAL KAROO :

	INS.
Buffels Kloof	1·20
Aberdeen, Gaol	0·59
Do. Bedford	...
Corndale	0·89
Aberdeen Road	...
Klipplaat	...
Winterhoek	...
Klipdrift	...
Kendrew, Holmes	0·84
Do.	0·80
Graaff-Reinet, Gaol	0·88
Do. (Eng. Yard)	0·82
Do. (College)	...
New Bethesda	0·88
Roodebloem	0·60
Glen Harry	0·62
Wellwood	0·84
Do. Mountain	...
Bloemhof	0·89
Jansenville	0·38
Patrysfontein	...
Bethesda Road	...
Afrikander's Kloof	...
Roode Hoogte	0·87
Toegedacht	0·40
Klipfontein	0·74
Cranemere	...
Pearston	0·70
Darlington	...
Walsingham	...
Arundale	...
Doornbosch, Zwagershoek	...
Middlewater	0·73
Somerset East, Gaol	1·38
Do. Do. College	...
Longhope	...
Cookhouse	0·96
Middleton	0·87
Spitzkop, Graaff-Reinet	0·57
Bruintjes Hoogte	...
Grobelaars Kraal	0·29

VIII. NORTHERN KAROO :

	INS.
Calvinia	0·05
Middlepost	...
Brandvlei	...
Onderste Doorns	...
Sutherland	...
Fraserburg	0·05
Scorpions Drift	...
Rheboksfontein	...
Klein Vlei	...
Carnarvon	0·23
Loxton	...
Beyersfontein	...
Wagenaars Kraal	...
Brakfontein	0·73
Victoria West	0·41
Omdraais Vlei	...
Doornkuilen	...
Britstown	0·14
Wildebeestkooij	0·14
Murraysburg	0·60
De Kruis, Murraysburg	0·70
Richmond	0·73
De Aar	...
Middlemount	...
Hanover	0·18
Theefontein	0·10
Zwagersfontein	...

VIII. NORTHERN KAROO (*con.*):	INS.
Philipstown	0·15
Boschfontein	
Petrusville	0·29
The Willows, Middelburg	0·36
Naauwpoort	
Middelburg (Gaol)	
Do.	
Do. (Government Farm)	
Jackalsfontein	
Ezelpoort	
Plaatberg	
Grape Vale	
Ezelfontein	
Roodepoort	
Groenkloof	
Vlakfontein	
Vogelsfontein	
Plaatfontein	
Colesberg	0·12
Tafelberg Hall	
Rietbult (Colesberg Bridge)	
Visch River	0·24
Varkens Kop	0·16
Culmstock	0·13
Droogefontein	0·00
Stonehills	
Cradock (Gaol)	0·74
Witmoss	1·01
Varsch Vlei	
Maraisburg	0·27
Steynsburg (Gaol)	0·48
Riet Vlei	
Hillmoor	
Quagga's Kerk	
Tarkastad	0·81
Do. (District Engineer)	0·57
Drummond Park	
Glen Roy	2·15
Waverley	0·50
Gannapan	
Montagu	0·20
Grape Vale	
Rietfontein, Cradock	
Schuilhoek	0·06
Vosburg	0·25
Zwavelfontein	
Holle River, Colesberg	
The Meadows, Schoombie	
Cradock (Station)	0·69
Hartebeestefontein, Steynsburg	0·35
Hotweg Kloof, Cradock	0·97

IX. NORTHERN BORDER:	INS.
Pella	1·50
The Halt	0·08
Keimoes	
Kenhardt	
Upington	0·52
Trooilapspan	0·32
Van Wyk's Vlei	
Prieska	
New Year's Kraal	0·19
Dunmurry	0·46
Karree Kloof	0·13
Griquatown	0·61
Campbell	
Douglas	0·53
Avoca, Herbert	
Hope Town	0·65
Orange River	

IX. NORTHERN BORDER (*con.*):	INS.
Newlands, Barkly West	1·24
Barkly West	1·93
Bellsbank	1·21
Kimberley (Gaol)	0·67
Do. Stephens	0·77
Strydenburg	
Stoffkraal (Dis. Prieska	0·55

X. SOUTH EAST:	INS.
Melrose (Div. Bedford)	1·03
Dagga Boer	1·24
Fairholt	1·20
Lynedoch	
Alicedale	
Cheviot Fells	1·02
Bedford (Gaol)	1·10
Do. (Hall)	2·39
Sydney's Hope	2·15
Cullendale	1·35
Adelaide	1·87
Atherstone	1·37
Alexandria	1·49
Salem	2·16
Fort Fordyce	
Fountain Head	
Graham's Town (Gaol)	2·07
Do.	
Heatherton Towers	1·22
Sunnyside	2·23
Vischgat	
Fort Beaufort	1·91
Katberg	
Balfour	2·42
Seymour	1·31
Glencairn	2·03
Alice	
Lovedale	1·86
Port Alfred	2·01
Hogsback	
Peddie	2·21
Exwell Park	
Keiskamma Hoek	1·81
Cathcart (Gaol)	1·59
Do. (Foreman)	1·68
Do.	1·83
Thaba N'doda	
Evelyn Valley	
Crawley	0·89
Thomas River	1·25
Perie Forest	
Forestbourne	4·33
Isidenge	
Kologha	
King William's Town (Gaol)	1·63
Do. Do. (Dr. Egan)	2·26
Stutterheim, Wylde	
Do. Bousfield	2·42
Fort Cunynghame	
Dohne	2·49
Kubusie	1·50
Quacu	
Blaney	1·75
Kei Road	
Berlin	
Bolo	1·48
Fort Jackson	3·96
Prospect Farm, Komgha	
Komgha (Gaol)	2·56
Chiselhurst	5·95
East London West	

X. SOUTH-EAST (*continued*):	INS.
East London East	3·12
Cata	...
Wolf Ridge	...
Dontsah	...
Mount Coke	...
Blackwoods	2·16
Albert Vale (near Bedford)	1·28*
Huxley Farm (Stutterheim)	1·75

XI. NORTH-EAST:	
Venterstad	0.22
Mooifontein	0·34
Burnley, Cyphergat	...
Burghersdorp (Gaol)	0·52
Ellesmere	0·29
Molteno	1·12
Lyndene	0·47
Cyphergat	...
Thibet Park	1·13
Sterkstroom (Station)	0·42
Do. (Gaol)	0·30
Rocklands	0·68
Aliwal North (Gaol)	0·38
Do. (Brown)	...
Do. (Dist Engineer)	0·19
Buffelsfontein	...
Hex's Plantage	...
Poplar Grove	...
Carnarvon Plaats	0·43
Halseton	0·61
Jamestown	0·90
Whittlesea	0·75
Queenstown (Gaol)	0·33
Do. (Beswick)	0·45
Rietfontein (Aliwal North)	0·88
Middlecourt	...
Dordrecht	1·67
Tylden	1·18
Nooitgedacht	...
Herschel	1·97
Lady Grey	1·15
Lauriston	1·92
Lady Frere	0·51
Contest (Near Bolotwa)	0·58
Sterkspruit	...
Doornkop	...
Avoca, Barkly East	0·80
Keilands	...
Palmietfontein	1·02
Barkly East	1·87
Blikana	...
Glenlyon	...
Rhodes	...
Gateshead	...
Cliftonvale	...
Albert Junction	0·38
Queenstown (Dis. Eng'rs Office)	0·55
Hughenden	0·09
Glenwallace	...
Indwe (District Engineer's Office)	0·56
Bensonvale Inst., Herschel	1·60
Cathcart, Queenstown	...
Royal, Div. Albert	...
Lady Grey Station	1·02
Stormberg Junction	0·69
Broughton, Molteno	1·00
Hopewell, Imvani	0·56
Sunny Meade, Div. Albert	0·42
Castle Hill, Aliwal North	0·56
Dordrecht (D.E.)	1·59

XII. KAFFRARIA:	INS.
Idu, Xalanga	1·43
Slaate, Xalanga	1·40
Cofimvaba	1·16
Tsomo	0·80
N'qamakwe	0·99
Main	0·66
Engcobo	1·59
Butterworth	1·48
Woodcliff	...
Kentani	1·62
Maclear	1·71
Idutywa	0·43
Bazeya	2·84
Willowvale	3·15
Mount Fletcher	0·48
Somerville, Tsolo	0·98
Elliotdale	1·91
M'quanduli	...
Matatiele	...
Umtata	1·80
Cwebe	4·80
Tabankulu	1·72
Mount Ayliff	0·62
Kokstad	0·81
Do., The Willows	1·26
Seteba	1·07
Flagstaff	2·61
Insikeni	2·47
Port St. John's	2·35
Kilrush, Sneezewood	...
Umzimkulu	1·89
Mandileni	...
Wanstead	1·47
Cedarville	...
Maclear Station	1·58
Elliot Station	0·77
Tent Kop, Elands Height	1·97
Umzimkulu (Strachan)	2·18
Elton Grange (Mount Currie)	1·30

XIII. BASUTOLAND:	
Mafeteng	1·65
Mohalies Hoek	2·68
Maseru	2·06
Teyateyaneng, Berea	2·03
Moyeni Quthing	...
Qacha's Nek	4·05
Leribe	...
Butha Buthe	...

XIV. ORANGE RIVER COLONY:	
Bloemfontein	...

XV. NATAL:	
Durban, Observatory	1·62

XVI. TRANSVAAL:	
Johannesburg	...

XVII. BECHUANALAND:	
Taungs	1·57
Vryburg	0·99
Mafeking	0·73
Setlagoli	...
Kuruman	...
Zwartlaagte	...
Nottinghame, Mafeking	0·75
Armadillo Creek, Vryburg	2·03

XVIII. RHODESIA:	
Hopefountain	0·02
Rhodes Matoppo Park	0·00

XIX. DAMARALAND:	
Walfish Bay	...

PRODUCE MARKETS.

CAPE TOWN.

Mr. R. Müller, Strand Street (Produce Department), reports for the month ending October 31 :—

Ostrich Feathers.—Supplies are coming in freely. All superior pluckings are sold at firm prices, while inferior quality remains difficult to move. Dealers will do well to bear in mind, that in order to facilitate sales of low class Feathers, they must be prepared to accept the ruling Market rates; the trade will not take these goods except at the established lower prices.

	£	s.	d.	£	s.	d.
Super Primes ...	15	0	0	35	0	0
First, ordinary to Super	10	0	0	14	0	0
Seconds	5	0	0	9	10	0
Thirds...	3	0	0	4	0	0
Femina Super ...	10	0	0	15	0	0
Do.. Seconds to Firsts	3	10	0	9	10	0
Byocks (Fancy) ...	5	0	0	9	0	0
Long Blacks	3	10	0	7	0	0
Medium Blacks ...	1	10	0	3	0	0
Short to Medium ...	0	10	0	1	5	0

	£	s.	d.	£	s.	d.
Floss	0	5	0	1	15	0
Long Drabs	2	0	0	3	10	0
Medium Drabs ...	0	15	0	1	10	0
Short to Medium ...	0	5	0	0	15	0
Floss	0	5	0	1	15	0
White Tails	1	0	0	2	10	0
Coloured Tails ...	0	5	0	1	10	0
Chicks...	0	1	0	0	2	0
Spadonas	2	0	0	3	0	0
Inferior Black and Drabs, short to long	0	0	6	1	10	0

Wool.—During the past month the annual Wool Sales were held at Swellendam, Heidelberg, Riversdale and Caledon, the quantity offered being about 3,400 Bales. The Darling Wools were sold in town this year. Prices ranged from 7¼d. to 8¼d. according to quality, the higher price having been paid for a very few superior Clips. The Market is somewhat uncertain and the demand is for best Wools only; inferior quality and wasty lots are neglected. The London Sales closed with a drop of 5 per cent. on Greasies and from 1d. to 2d. on Scoured Wools.

	s.	d.	s.	d.
Super long Grass Veld ..	0	7	0	8
Do. Karoo	0	5½	0	7
Medium	0	4	0	5¼
Short and inferior	0	3½	0	4
Wool for Washing	0	4½	0	5½
Snow-white Super to Extra	1	4	1	7
Do. Ordinary ...	1	1	1	4
Fleece Washed	0	0	0	9

Mohair.—The Market remains quiet. Sales were mostly made in Winter Kids. Very little Winter Hair has changed hands, as fe worders for this class are on hand. Business in Bradtora is quiet and long stapled Clips only are sold readily.

	s.	d.	s.	d.
Firsts, Summer	0	8½	0	11
Kids	1	0	1	5½
Seconds	0	5	0	6
Winter	0	7	0	8½
Do. Kids...	0	11	1	1

Hides and Skins.—There is a firm Market for all classes. All consignments coming forward will meet with a good demand. The tendency is for firmer prices.

	s.	d.	s.	d.
Long woolled Skins ...	0	4¾	0	5½
Short...	0	3½	0	3¾
Shorn	0	2¼	0	3
Bastards	0	2¾	0	3¼
Cape Skins, each	1	5	1	10
Do., cut, each ...	0	0	1	0
Goat, heavy to light ...	0	8¼	1	0¼
Sundried	0	0	0	5
Angoras	0	0	0	4½
Sundried Hides	0	5	0	7¼
Salted	0	4½	0	6
Wet...	0	3	0	3½

PORT ELIZABETH.

Messrs. John Daverin & Co. report for the week ending October 30 :—

Ostrich Feathers.—The market was fully supplied this week with a fair average assortment. Competition was rather more active than last week, and prices generally showed some improvement, especially in the case of good Femina and Drabs, which fetched very full prices. The total quantity sold amounted to £10,141 18s. 11d., and weighed 4,784 lbs. 3½ ozs.

	£	s.	d.		£	s.	d.
Primes: Extra Super	Special Prices.						
Good to Super ...	14	0	0	to	25	0	0
Whites: Firsts ...	10	0	0	„	14	0	0
Seconds ...	5	0	0	„	9	0	0
Thirds ...	0	10	0	„	3	0	0
Feminas: Super ...	9	0	0	„	14	0	0
Firsts ...	6	0	0	„	10	0	0
Seconds ...	3	10	0	„	6	10	0
Thirds ...	0	5	0	„	3	0	0
Greys ...	1	10	0	„	6	0	0
Fancy	3	10	0	„	7	10	0
Tails: White	0	10	0	„	2	15	0
Light	0	10	0	„	1	15	0
Coloured & Dark	0	1	0	„	0	15	0

	£	s.	d.		£	s.	d.
Blacks: Long ...	2	10	0	to	5	10	0
Medium ...	1	0	0	„	2	15	0
Short ...	0	5	0	„	0	17	6
Wirey ...	0	0	3	„	0	0	6
Floss ...	0	5	0	„	1	7	6
Drabs: Long... ...	1	0	0	„	3	10	0
Medium ...	0	12	6	„	1	10	0
Short... ...	0	2	6	„	0	7	6
Wirey ...	0	0	3	„	0	0	6
Floss... ...	0	5	0	„	1	10	0
Spadonas: Light ...	0	5	0	„	3	0	0
Dark ...	0	2	6	„	1	10	0
Chicks...	0	0	3	„	0	1	0

The following may be quoted as the approximate current values of unsorted parcels, per line :—

	Whites.	Feminas.
Superior pluckings	£8 0 0 to £9 0 0	£5 10 0 to £6 10 0
Good Average lots	6 10 0 to 7 0 0	1 0 0 to 5 0 0
Poor Average lots	4 10 0 to 5 10 0	2 10 0 to 3 5 0
Commen lots, stalky, narrow and discoloured	3 10 0 to 4 10 0	1 10 0 to 2 10 0

	Tails.	Blacks.	Drabs.	Spadonas.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
Good ...	15 0 to 20 0	17 6 to 27 6	12 6 to 15 0	15 0 to 30 0
Average ..	9 0 to 12 6	15 0 to 17 6	7 6 to 10 0	7 6 to 12 6
Poor ...	5 0 to 8 0	10 0 to 12 6	5 0 to 7 6	2 6 to 5 0

It will be understood that for Special Lots, these quotations may be exceeded.

Wool. The market continues steady, and a fair amount of business has been done in the open market during the week. On yesterday's public market a fairly large quantity was offered, and prices showed no change from last week

Snowwhite, Extra Superior ...	17d	to	17½d
Do. Superior	16d	„	16½d
Do. Good to Superior...	15d	„	15½d
Do. Inferior Faulty ...	13d	„	14d
Grease, Super Long, well-conditioned, Grassveldt grown (special clips) ...	7d	„	7½d
Do. do. do. ...	6d	„	6½d
Do. do. Karoo grown (special clips)	6½d	„	7¼d
Do. do. do. ...	5½d	„	6¼d
Do. do. Mixed Veldt...	5½d	„	6½d
Do. Light, faultless, medium Grassveldt grown ...	5½d	„	6d
Do. do. Karoo grown	5½d	„	6d
Do. do. short, do.	4½d	„	5d
Grease, Coarse and Coloured ...	1½d	to	3d
Scoured do. do. ...	2d	„	2½d
Basuto Grease, short	5d	„	5d
O.R.C. Grassveldt Grease, long & well-conditioned (special clips)	6d	„	6¾d
Do. do. do. ...	5¼d	„	5¾d
Do. do. medium grown, light, with little fault	5d	„	5½d
Do. do. short, faulty & wasty	4¼d	„	5d
Do. do. Karoo grown, long & well-conditioned ...	5¼d	„	6d
Do. do. medium grown, light with little fault ...	4d	„	4½d
Do. do. short, faulty and wasty...	4d	„	4½d

Mohair. This market remains quiet, and very little business has been done in the open market since the date of our last report. A few sales of Winter Hair at 8¼d. to 8½d., and Kids at 12d. to 13d., have been the only business put through during the week. On the public market on Tuesday a large quantity was offered, but competition was restricted, and prices generally ruled in favour of buyers.

Super Kids	16½d	to	17½d
Ordinary Kids and Stained ...	12d	„	13d
Superior Firsts, special clips	11d	„	11d
Ordinary Firsts...	10d	„	10½d
Short Firsts and Stained ...	9d	„	9½d
Superfine Long Blue O.R.C. Hair	11d	„	11½d
Mixed O.R.C. Hair (average)	8d	to	9d
Do. very mixed ...	6½d	„	7½d
Seconds and Grey	5d	„	6d
Thirds	4d	„	4d
Winter Kids, special clips ...	12½d	„	13d
Do. good ordinary ...	11d	„	11½d
Winter Hair	8d	„	8½d
Basuto Hair	9d	„	9d

Skins are firm. Sheepskins in bundles, 5d.; Pelts, 3½d.; Capes, 17½d.; damaged, 5d. each; Goatskins, 11½d.; damaged, 6d. per lb.; Angoras, 6⅝d.; Shorn, 5d.; damaged, 3½ per lb.; Springbok, 8d. each; Johannesburg sheep, 4⅞d.; Goat, 7½d.; Angoras, 4½d.

Hides.—Sundried, 7½d.; damaged, 6½d.; Salted, 6½d.; damaged, 5½d.; Thirds, 3½d.

Horns.—3½d. each all round.

EAST LONDON.

Messrs. Malcomess & Co. report for the month of October:—

Wool.—The chief feature of this month has been the London Wool Sales. These opened on 29th September with the following result: Australian Merinos showed no change from last sales; Long Combing showed no change from last sales; Short Heavy Faulty Greases were par to 5 per cent lower than last sales; Snow-whites were par to 5 per cent. lower than last sales. As the total quantity to be offered amounted to no less than 255,000 bales, wherein Cape Greases and Scoureds were figuring more prominently than usual, it was soon felt that the opening rates would not be maintained. In the second week Snow whites were ½d. to 1d. lower than the close of previous sales; Heavy Long Combing, ½d. to 1d. lower; and Short Grease fully ¼d. lower. The end was that the sales closed flat without further change in prices, and that 35,000 bales Australian and 5,000 bales Cape wools were held over for next series. This cannot be considered a healthy state of affairs, and until we see the whole of the old clip lifted right off the market we cannot hope for that return of confidence which is necessary to creating better demand and with it better prices.

Turning from London to the Cape itself, we find all New Seasons Wools meeting with keen competition, whilst the old are lying friendless and neglected. New Seasons Native Wools are being snapped up with keenness and we have sold at 5½d. for very average Transkei Native Grease, 5⅝d. to even 5¾d. for Superior ditto, whilst Basuto Grease has changed hands without much trouble at 5d. and, in isolated cases, even 5⅛d.

Up country Wools have come in very slowly; when light and well conditioned they have met with ready sale, but when heavy and interior they proved more difficult of sale.

The following prices have been realised:—

	6 months.	12 months.
Aliwal	4¼d to 4½d	4¾d
Burghersdorp, Heavy Red	4⅛d .. 4¼d	4¼d
Burghersdorp, Bluish (superior) Stormberg	4½d .. 4¾d	5½d to 6d
Dordrecht, according quality & condition	4¼d	5½d
Lady Grey	4¾d .. 5d	5½d
Barkly East ...	5d	6d
Elliot	5d	5½d .. 6d
Molteno, Heavy Red	4¼d .. 4½d	5d
Do. Superior Blue Stormberg ...	4¾d	5¾d .. 6¼d
Tarkastad, Heavy Red	4½d	
Do. Light Blue	5d	5¼d .. 6¼d

	6 months.	12 months.
Queenstown, according to quality & condition	5d	6¼d
Cathcart do.	5¼d to 5¾d	6d to 6½d
Stutterheim ...	5¼d	6½d
O.R.C.		
Northern, according to quality & condition	4¾d	5¾d .. 6¼d
Reddersburg do.	4½d .. 4¾d	4¾d .. 5¼d
Wepener do.	4¼d .. 4½d	4¾d .. 5¼d
Rouxville do.	4¼d	—
Zastron do.	4¾d	5¼d
Philoppolis do.	4¼d .. 5d	5d .. 5½d

East London will hold its first Public Wool Auctions on Wednesday, 4th prox. Thereafter sales will be held weekly until further notice. An attractive list is being drawn up, and keen comptition is anticipated for all desirable lots.

Mohair has been selling in fairly large quantities, more particularly Basuto Hair. In consequence of rather large quantities of the latter having changed hands, more pressing requirements have been filled, and the present stock of about 300 bales is hanging fire because holders are still asking full prices, which buyers, with fair quantities already purchased and unsold, are not keen on paying. We have realised the following prices: 11d. for Superior Long Blue Hair of 12 months' growth; 9¾d. for good average Blue, but kempy: 9d. for Basuto Hair; 3d. to 5d. for Dockings; 8d. to 8½d. for Winter Hair; 12d. for genuine Winter Kids.

Hides have been keenly sought after, and have sold easily at 6½d. for Dry-salted and 7½d. for Sun-dried. A Public Sale was held in London on the 29th, and brought a decline of ⅛d. on Dry salted Hides. In spite of the fact that Hides have sold here at 7½d. and 6½d. for Sun-dried and Dry-salted respectively, we fear the prices likely to rule now are 7d. 7¼d. and 6d.—6¼d., and we shall not be surprised if the tendency is towards lower values for some time to come.

Sheepskins.—A Public Sale was held in London on the 23rd, when values generally showed no change. Superior Roans were firmer by ⅛d. to ¼d., but this was, however, reacted on inferior qualities, which went in favour of buyers. The average prices for the month were: 4¾d. to 5d. for 1st class Merino Skins; 3½d. to 3¾d. for 2nd class Merino Skins; whilst Transkei and King William's Town country parcels touched up to 4d.

Goat and *Angora Skins* were firm and keenly competed for up to 10¾d. for Goat skins, 6½d. for Angora skins, and 4d. each for damages.

Horns, according to size and quality, 2d. to 4d. each.

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 24th October, 1908, ruling at the several centres named, is published for general information.

CENTRE.	A. Wheat per 100 lbs.	B. Wheat Flour per 100 lbs.	C. Boer Meal per 100 lbs.	D. Mealies per 100 lbs.	E. Mealie Meal per 100 lbs.	F. Barley per 100 lbs.	G. Oats per 100 lbs.	H. Oat-hay per 100 lbs.	J. Potatoes per 100 lbs.	K. Tobacco (Boer Roll) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d	£ s d		
Aliwal North ..	0 11 0	0 14 6	0 12 6	0 7 0	0 8 6	0 7 6	0 10 0	0 6 6	0 17 6	0 2 0	0 0 7	0 0 7	0 1 6	0 1 3	£9	13/-
Beaufort West ..	0 11 6	0 18 0	0 14 0	0 8 6	0 10 0	0 8 6	0 8 0	0 5 0	0 16 0	0 0 6	*3d., 4d.	*3d., 5d.	0 1 2	0 1 0	£9	16/-
Burghersdorp ..	0 11 0	0 16 6	1 8 6	0 7 6	0 19 0	0 8 6	0 15 6	0 6 6	0 11 0	0 0 6	0 0 9	0 0 5	0 1 9	0 1 0	..	..
Cape Town ..	..	..	..	..	..	0 6 0	0 6 0	0 3 0	0 10 0	..	..	..	0 1 3	0 1 0	..	..
Clanwilliam ..	0 13 3	..	0 14 3	0 8 0	0 10 0	0 8 0	0 8 0	..	0 8 0	0 0 9	0 0 6	0 0 7	0 1 3	0 1 0	..	..
Colesberg ..	..	..	..	..	..	..	..	..	..	..	0 0 4	0 0 3½	0 1 7	0 1 3	..	..
Cradock ..	..	..	0 13 0	0 6 9	..	0 8 9	..	0 5 0	0 17 0	0 0 6	0 0 7	0 0 6	0 1 3	0 0 9	..	..
Dordrecht ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
East London ..	0 8 9	0 16 6	0 12 6	0 7 6	0 11 6	0 8 0	0 7 0	0 4 6	0 12 6	0 1 0	0 0 4	0 0 5	0 1 7	0 0 10	£10	19/-
Graaff-Reinet ..	0 11 6	..	..	0 6 6	..	0 6 0	0 5 6	0 6 6	0 13 0	0 0 4	0 0 4½	0 0 5	0 2 0	0 0 10	£10	18/6
Grahamstown ..	..	..	..	0 8 6	..	0 5 6	0 11 6	0 5 9	0 16 3	0 0 6	0 0 6	0 0 6	0 1 6½	0 1 2	..	..
Kimberley ..	0 13 0	0 16 0	0 13 9	0 6 6	0 7 11	0 5 11	0 6 8	0 4 9	0 14 8	0 0 5	0 0 8	0 0 6½	..	0 0 9	£9 15s.	13/3
King William's Tn..	0 11 0	0 17 0	0 14 6	0 7 6	0 8 0	0 9 0	0 9 0	0 3 0	0 14 0	0 0 6	0 0 6	0 0 6	0 1 6	0 0 10	£16	23/9
Malmesbury ..	0 10 0	0 15 0	0 12 6	0 9 0	..	0 5 6	0 4 8	0 2 3	0 15 0	0 3 0	0 0 6	0 0 6	0 1 2	0 0 10	£9	19/-
Mossel Bay ..	0 14 0	0 14 0	0 14 6	0 8 0	0 8 6	0 8 0	0 7 0	0 4 6	0 10 0	0 0 6	0 0 7	0 0 8	0 1 3	0 0 9	..	..
Port Alfred ..	0 12 0	0 18 0	0 15 0	0 8 0	0 10 0	0 9 0	0 10 0	0 5 0	0 12 0	0 0 6	0 0 6	0 0 6	0 1 3	0 0 6	..	..
Port Elizabeth ..	..	..	..	0 7 9	..	0 7 9	0 8 0	0 4 6	0 18 0	..	0 0 7	0 0 7	0 1 7	0 1 2	..	..
Queenstown ..	0 10 0	0 15 6	0 13 0	0 6 9	0 8 0	0 8 6	0 9 0	0 4 9	0 14 0	0 0 7	0 0 5	0 0 6	0 2 3	0 1 0	£12 to £14	18/- to 22/-
Tarkastad ..	0 14 0	0 10 6	0 16 0	0 8 6	0 10 6	0 9 0	0 8 6	0 7 6	0 7 9	0 1 0	*0 0 5	*0 0 5	0 2 6	0 1 0	£10	20/-
Vryburg ..	0 14 0	1 0 6	0 13 0	0 7 9	0 8 6	0 11 0	0 9 0	0 3 0	1 0 0	0 1 4	0 0 8	*†5d. to 9d	*†5d to 6d	0 0 9	£8 to £12	12/6 to 17/6
Worcester ..	0 10 0	0 16 0	0 12 3	0 8 0	0 9 0	0 7 0	0 6 0	0 2 6	0 12 6	0 0 4	4d to 8d.	0 0 5	0 1 3	0 0 9	£7 to £12	16/- to 23/6
Johannesburg ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

NOTE.—A blank space denotes "no transactions." * Colonial. † Frozen.

AGRICULTURAL SHOW SEASON, 1909.

FIXTURES AND DATES.

The following dates have been arranged for the Agricultural Show Season of 1909:—

Paarl: Thursday, January 21.
Stellenbosch: Thursday, January 28.
Robertson: Wednesday, February 10.
Queenstown: Wednesday and Thursday, February 17 and 18.
Aliwal North: Tuesday and Wednesday, February 23 and 24.
Western Province (Rosebank): Tuesday, Wednesday, and Thursday, February 23, 24 and 25.
Cathcart: Wednesday, February 24.
Molteno: Tuesday and Wednesday, March 2 and 3.
Middelburg: Wednesday and Thursday, March 3 and 4.
King William's Town and East London (Combined Show at King William's Town): Wednesday and Thursday, March 10 and 11.
Wodehouse, at Dordrecht: Wednesday, March 17.
Cradock: Tuesday and Wednesday, March 16 and 17.
Grahamstown: Thursday and Friday, March 18 and 19.
Bloemfontein: Tuesday, Wednesday, and Thursday, March 16, 17 and 18.
Port Elizabeth: Tuesday, Wednesday, Thursday and Friday, March 23, 24, 25 and 26.
Oudtshoorn: Wednesday and Thursday, April 7 and 8.
Further dates will be published as they are fixed.

SECOND EGG LAYING COMPETITION.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

RECORD FOR OCTOBER, 1908, AND TOTALS TO END OF OCTOBER.

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date. Eggs.	Total per Pen to date. Weight ozs.
1	C. H. van Breda	White Leghorns	1	23	$43\frac{13}{16}$		
			2	22	$41\frac{9}{16}$		
			3	24	$40\frac{3}{16}$		
		(Died 16.10.08)	4	10	20	103	$718\frac{13}{16}$
2	F. Muller ...	Black Minorcas	5	21	$15\frac{15}{16}$		
			6	19	$39\frac{1}{16}$		
			7	4	$8\frac{6}{16}$		
			8	8	$16\frac{12}{16}$	150	$317\frac{11}{16}$
3	H. Chas. Starke	Buff Orpingtons	9	15	$27\frac{6}{16}$		
			10	19	$38\frac{8}{16}$		
			11	12	$22\frac{10}{16}$		
			12	12	$25\frac{9}{16}$	244	$470\frac{13}{16}$
4	J. W. Wright ...	White Wyandottes	13	17	$33\frac{5}{16}$		
			14	8	$14\frac{7}{16}$		
			15	11	$24\frac{15}{16}$		
			16	18	37	203	$420\frac{12}{16}$
5	C. H. van Breda	White Leghorns	17	23	$44\frac{11}{16}$		
			18	23	$41\frac{12}{16}$		
			19	19	$39\frac{10}{16}$		
			20	18	$33\frac{10}{16}$	432	$835\frac{12}{16}$
6	F. T. Hobbs ...	Silver Wyandottes	21	13	$21\frac{14}{16}$		
			22	18	$34\frac{13}{16}$		
			23	17	$31\frac{4}{16}$		
			24	13	$24\frac{1}{16}$	195	$358\frac{3}{16}$
7	H. D. Bradley...	Silver Wyandottes	25	10	$20\frac{2}{16}$		
			26	10	$19\frac{13}{16}$		
			27	18	$30\frac{8}{16}$		
			28	16	$28\frac{12}{16}$	236	$448\frac{3}{16}$
8	J. G. Lay ...	White Leghorns	29	24	$43\frac{3}{16}$		
			30	24	$44\frac{12}{16}$		
			31	20	$41\frac{8}{16}$		
			32	20	$35\frac{12}{16}$	343	$676\frac{2}{16}$
9	C. H. van Breda	White Leghorns	33	19	$35\frac{11}{16}$		
			34	21	$39\frac{7}{16}$		
			35	20	$36\frac{10}{16}$		
			36	23	$41\frac{11}{16}$	380	723
10	R. Johnston ...	Buff Orpingtons	37	17	$33\frac{15}{16}$		
			38	12	$21\frac{5}{16}$		
			39	10	$17\frac{6}{16}$		
			40	10	$18\frac{6}{16}$	218	$404\frac{6}{16}$

RECORD FOR OCTOBER, 1908, AND TOTALS TO END OF OCTOBER—*cont.*

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date. Eggs.	Total per Pen to date. Weight ozs.
11	S. Smith ...	Silver Pencilled Wyandottes	41	12	$22\frac{4}{16}$		
			42	9	$14\frac{4}{16}$		
			43	16	$27\frac{14}{16}$		
			44	20	$33\frac{5}{16}$	213	$359\frac{7}{16}$
12	(Vacant).		...	...	...	...	...
13	S. Smith ...	Brown Leghorns	49	23	$42\frac{4}{16}$		
			50	11	$21\frac{10}{16}$		
			51	22	$39\frac{2}{16}$		
			52	18	$32\frac{15}{16}$	255	$472\frac{2}{16}$
14	Clifford Hoole...	Black Minorcas	53	21	$40\frac{7}{16}$		
			54	21	$29\frac{11}{16}$		
			55	21	$34\frac{10}{16}$		
			56	19	$35\frac{13}{16}$	400	687 [illegible]
15	S. Smith ...	White Leghorns	57	24	$42\frac{14}{16}$		
			58	16	$27\frac{2}{16}$		
			59	19	$38\frac{2}{16}$		
			60	21	$36\frac{5}{16}$	401	734 [illegible]
16	S. Smith ...	White Leghorns	61	20	$33\frac{8}{16}$		
			62	25	$42\frac{4}{16}$		
			63	20	$39\frac{8}{16}$		
			64	24	$41\frac{11}{16}$	385	$677\frac{7}{16}$
17	W. R. Allen ...	White Leghorns	65	21	$34\frac{9}{16}$		
			66	19	$44\frac{5}{16}$		
			67	21	$42\frac{2}{16}$		
			68	19	$40\frac{2}{16}$	266	$527\frac{5}{16}$
18	S. Smith ...	White Wyandottes	69	23	$40\frac{15}{16}$		
			70	9	$15\frac{2}{16}$		
			71	14	$30\frac{4}{16}$		
			72	11	$20\frac{15}{16}$	271	$515\frac{5}{16}$
19	R. W. Hazell ...	Blue Andalusians	73	19	$36\frac{12}{16}$		
			74	21	$38\frac{5}{16}$		
			75	21	$39\frac{4}{16}$		
			76	20	$40\frac{3}{16}$	310	$593\frac{4}{16}$
20	Clifford Hoole...	Brown Leghorns	77	20	36		
			78	16	$28\frac{12}{16}$		
			79	15	$27\frac{1}{16}$		
			80	25	$44\frac{3}{16}$	312	$611\frac{14}{16}$
21	R. W. Hazell ...	White Wyandottes	81	15	$30\frac{3}{16}$		
			82	Dead			
			83	21	$44\frac{12}{16}$		
			84	19	$34\frac{1}{16}$	217	$428\frac{5}{16}$
22	S. Smith ...	White la Bresse	85	17	$29\frac{10}{16}$		
			86	10	$18\frac{13}{16}$		
			87	11	$19\frac{7}{16}$		
			88	17	$32\frac{1}{16}$	260	46[illegible] $\frac{13}{16}$
23	R. J. Williams	Black Minorcas	89	15	$33\frac{9}{16}$		
			90	18	$36\frac{4}{16}$		
			91	16	$33\frac{7}{16}$		
			92	16	$32\frac{14}{16}$	185	$380\frac{13}{16}$

BREEDERS' DIRECTORY & FARMING NOTICES.

Advertisements under this heading are inserted at the rate of 30 words for 2s. 6d., (minimum charge) per insertion, and 6d. per line of approximately six words above that number. Payment must accompany Order. Cheques and P.O.O. to be made payable to the CENTRAL NEWS AGENCY 125-127, Long Street, Cape Town, to whom all communications should be addressed.

OSTRICHES.

SPECIALS ONLY.—Choice pairs, 2 years' old. £60 to £100 per pair. Younger birds at lower prices. — F. W. BAKER, Laughing Waters, Willowmore.

OSTRICHES. — Young and old.—For further particulars, apply to Mr. R. S DE VILLIERS, The Imperial Cold Storage and Supply Co., Ltd., Porterville Road.

PIGS.

BERKSHIRE BOARS.—Pure bred. Ages two to fifteen months. Bred by Charles Leonard, Esq. on his well known "Gloria" Estate —For further particulars, apply to Mr. R S. DE VILLIERS, The Imperial Cold Storage and Supply Co, Ltd, Porterville Road.

PURE BRED BERKSHIRE PIGS.—Prize Winning Stock. Boars and Sows, £3 each. Also Buff Orpington and White Leghorn Poultry. —Apply MANAGER, Maitland River Farm, Green Bushes Hotel, Port Elizabeth.

CATTLE.

FRIESLAND BULLS, bred from the best IMPORTED stock, from a few weeks to fifteen months old.—For further particulars, apply to Mr. R. S. DE VILLIERS, The Imperial Cold Storage and Supply Co. Ltd., Porterville Road.

GENERAL.

PASPALUM GRASS PLANTS.—Strong roots per Rail or smaller plants per Post to any address. See larger advertisement, page ix. this Journal.—A. C. BULLER, Dwarsriviers Hoek, Stellenbosch.

SITUATION WANTED on farm as tutor or to keep books and light farm work. Good references. Apply W. H. HART, High View, Hatfield Road, Green Point, Cape Town.

THE POULTRY YARD.

BUFF ORPINGTONS, SILVER WYANDOTTES, BLACK MINORCAS. Winners of over 90 prizes. Bred for Utility and Show points. PULLETS from 10/-, also COCKERELS from 7/6. Will improve the table and laying qualities of common fowls. Mrs. R. F. DOTT, Kenilworth, Kimberley.

HAZELL, Tregenna, Park Road, Rondebosch. Prize and utility. Andalusians, Brown Leghorns, White and Columbian Wyandottes. Two hundred prizes, including Two Gold Medals and Three Silver Cups. Have pen containing winners last Rosebank Laying Competition. Correspondence invited.

WRIGHT BROS., Highlands, Cape. Breeders of Black and Buff Orpingtons, White and Partridge Wyandottes, Black Langshans and Champion Laying WHITE LEGHORNS. Birds for Sale from 10/6 up. Terms Cash. Birds not approved may be returned. Please Note 400 Birds to select your wants from. Please mention this paper.

WHITE LEGHORNS.—Best American Utility Strains. Settings of Eggs for sale, from pure-bred utility White Leghorns, F.O.R., 10/6 per setting of 15. Cockerels, 10/- to 20/-. Terms, cash with order. Mrs. W. L. STEEL, Stellenbosch.

BUFF ORPINGTONS. — THE FARMER'S FOWL. The fowl that LAYS WHEN EGGS ARE TOP PRICE. A 1 TABLE BIRDS. My Buffs have unlimited orchard and grass run, and are noted for hardiness and good laying qualities. Young stock always for sale at very reasonable prices Ask for inclusive quotations; carriage paid to any station in South Africa and AT MY RISK to rail destination. My list of prizes won at shows all over South Africa will convince you that this unrivalled *Colonial* strain of 10 years' standing CAN HOLD ITS OWN AGAINST IMPORTED STOCK. Buy hardy Colonial-bred birds and save your pocket. Address: A. C. BULLER, Dwarsriviershoek, Stellenbosch.

ANGORA AND MERINO RAMS.

The following members of the Bedford C.C. Ram Breeders' Association will hold Public Sales of all Rams they breed for Sale (now sold privately on farm), on the Second Thursday in September October, January, March, at 11 o'clock, at Bedford:—

PRINGLE BROTHERS	Glen Thorn, P.O. Linton, Adelaide.	
C. W. WEBBER	Havelock Holme, P.O. Bedford.	
T. W. KING	Kingsvale,	do.
A. A. HOCKLY	Cullendale,	do.
W. D. HOCKLY	C mmando,	do.
E. J. PRINGLE	Penderny,	do
KEITH ROSS	Carvers,	do.
PAINTER & LEONARD	Prospect,	do.
&c., &c.,	&c.	

All particulars and Catalogues to be obtained from the above.

Clients not being able to attend may place their orders with any of the Breeders, who (on satisfactory reference being given), will buy for them at the Sale.

THOMAS WM. KING, President.

T. C. HALL, Secretary.

Convent of the Sacred Heart

CRADOCK.

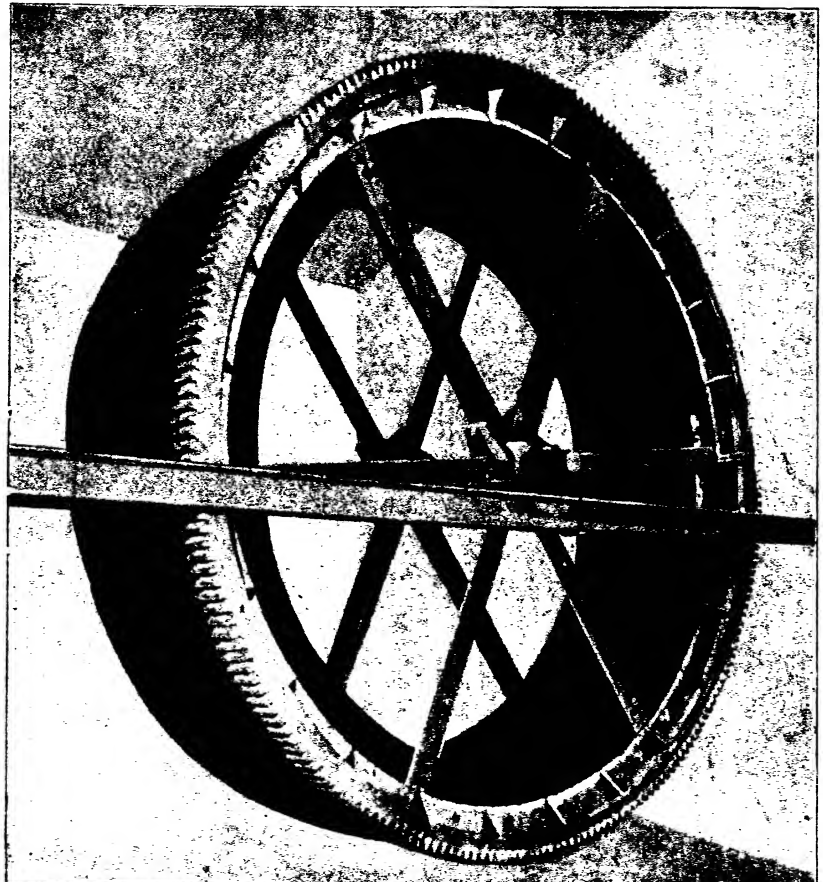
HIGH SCHOOL FOR YOUNG LADIES.—Conducted by the Dominican Sisters

BOARDING DEPARTMENT.—Under the personal supervision of the Sisters

Fees £30 per annum, including School Fees.

EXTRAS.—Laundry 15/- per Quarter, Music 30/- per Quarter, Entrance Fee £1.

All Fees to be paid Quarterly in advance.



THE

Agricultural Journal

OF THE CAPE OF GOOD HOPE.

No. 6. DECEMBER, 1908. VOL. XXXIII.

Published Monthly in English and Dutch by the Department of Agriculture and distributed gratis to bona fide farmers in the Cape Colony on application through the Resident Magistrate of the District.

SUBSCRIPTION 5s. PER ANNUM. Post Free in South Africa.
Remittances to be made Payable to the Publishers CAPE TIMES, LTD., Church St., Cape Town.

Advertising.—Approved Advertisements are inserted. Full particulars can be obtained from the Sole Advertising Contractors, THE CENTRAL NEWS AGENCY, LTD., 125-127, Long Street, Cape Town—P.O. Box 9—Telephone No. 438—Telegraphic Address: "Periodicals"—to whom also all accounts must be paid.

Postal Address:
The Editor "Agricultural Journal," Department of Agriculture, Cape Town.
Telegraphic Address: "Bulletin," Cape Town.

CONTENTS.

NOTES.

The Exportation of Angora Goats.

As legislation has been enacted and promulgated, prohibiting the exportation of Angora Goats from the Transvaal, Orange River Colony, Natal, Southern Rhodesia, Mozambique, Basutoland, the Bechuanaland Protectorate and Swaziland, except to such South African States and Colonies as have enacted similar prohibitive legislation, the exportation of Angora Goats from this Colony to the States and Colonies named is *ipso facto* permitted.

"Diaspis pentagona."

Mr. F. P. Hansen, Consul-General for the Argentine, informs us that a law has been promulgated by the Argentine Government on the 31st August (No. 5556), offering a reward of $50,000 paper (about £4,350) for the discovery of a cheap and efficacious method of destroying the tree disease or pest "Diaspis pentagona."

Thinning of Grapes for Export.

A communication has been received from the Trades Commissioner urging that those who intend to ship grapes during the forthcoming season should make an experiment of thinning out the bunches of grapes in a small portion of their vineyards, so that the fruit, as nearly as possible, may be presented in a similar condition to that which offers from European hothouses. It is suggested that a careful account of the cost should be kept so that it might be shown whether the increased expenditure is justifiable. The London fruit factors express themselves as confident that the results will amply repay all the trouble and expense involved.

Condemned Fruit.

The Acting Director of Agriculture (Transvaal) writes in reply to enquiries from this Department that the ten cases of apples reported in our last as consigned from J. Goldstein, of Grahamstown, and condemned in the Transvaal as being infested with Codlin Moth, were not so infested, but were suffering from the presence of Black Rot (*Sphaeropsis malorum, Peck*).

Railway Rebate on Carriage of Oil and Material used in connection with Irrigation Works.

It is notified, for general information, that all applications for Railway Rebate on carriage of oil used as fuel for irrigation purposes, and of material used in irrigation works, must in future be addressed to the Local Railway Traffic Manager, and not to the Secretary for Public Works as heretofore.

Insurance of Live Stock in Denmark and Norway.

An article was published in the "Journal of the British Board of Agriculture," in April last, in which information was given as to the systems for the insurance of live stock which prevailed in Holland, Belgium, France, Switzerland, Germany, and Sweden, and the Board have now received, through the Foreign Office, information as to the methods adopted in Denmark and Norway.

Denmark.—As regards Denmark, Mr. Consul Funch reports that, generally speaking, insurance is not so highly developed in Denmark as in some other European countries, though it has existed, especially as regards horses, since the year 1100. At present there are about 1,400 small mutual associations, one in each parish, for the insurance of horses, in which the losses are distributed among all the members in proportion to the amounts for which they are insured. The administration is primitive, but has the advantage that the members are able to control each other. The narrow limits in which these associations work may, in cases of grave local epidemics, lead to serious consequences. There are a number of companies for the insurance of stock, of which the oldest was founded in 1859. This is called the "Kreaturforsikrings Forening" (Domestic Animal Insurance Association) of Denmark, and gives compensation for losses incurred by the death of horses, cattle, sheep swine, or goats from sickness (except cattle plague). Compensation is also given for severe injuries. The amount insured in this company in 1902 was £194,000, and its reserve fund amounted to £3,300. It pays the full value of the animal, but a maximum value is imposed, which in the case of cattle is fixed at £16 12s. The premium for cattle is 3 per cent., excluding, or 5 per cent. including, losses from tuberculosis. There are three other similar associations. There is also an association known as "Kustos," which undertakes the insurance of the whole stock on a farm. The whole live stock is insured, and if at least two animals die from disease or accident, compensation is paid for the least valuable of the first two at the rate of 40 per cent. of the value, and subsequent ones at the rate of 80 per cent. If only one animal dies, only 40 per cent. is paid. All owners who have insured their stock in this way may also insure horses and cattle separately for other risks. This company is chiefly patronised by estate owners and large farmers, and the amount it had insured in 1906 was £1,346,000, together with special insurances to the amount of £526,000. The expenses of administration in this company are very low, being only at the rate of about one penny for every £5 insured. The number of members was 1,691. In 1901 another company, known as "Pan" was established at Copenhagen, under the patronage of a number of leading farmers, members of Parliament, and other prominent persons. This company insures all classes of animals, and also against several special risks. It also undertakes the re-insurance of the

small local mutual associations mentioned above. Three-quarters of the profit is allotted as a bonus to the insured. The amount insured in 1904 was £44,000. Besides the above companies, some few local insurance associations exist for the insurance of stallions and bulls for breeding purposes. The first receive no subvention from the State, but the associations for the insurance of bulls receive small grants. About one half the total number of horses, one-sixth of the cattle, and one-thirtieth of the pigs are insured in Denmark.

Norway.—A memorandum forwarded by Sir Arthur Herbert, K.C.V.O., H.M. Minister at Christiana, states that the insurance of live stock in Norway is purely voluntary; but, judging from the large number of private societies that have been formed for the purpose of mutual insurance, it would appear that the principle finds acceptance among the farmers. One or two of these societies carry on business all over the country, but the others, between 100 and 200 in number, are local. Some of these insure only horses, others only cattle, and others again both horses and cattle. Some societies will only insure the whole farm stock, others single animals; some insure against loss by illness or death, others only against death or necessary slaughter; some compensate for the whole of the loss that has been sustained, others for only part of it. The authorities appear to have originally entertained some doubt as to the advisability of promoting the institution of some small local societies as they believed that the risks would not be so great, and that the administration would be simplified if the societies covered larger districts. Experience has, however, proved that under the conditions prevailing in Norway, where small and widely scattered farms are the rule, local societies based on mutual insurance among the members are those which can do most towards the general insurance of live stock. In order to assist societies that might be formed for this purpose, the Department of Agriculture has prepared a set of model rules. The principal points suggested are:—(1) That each society should consist of two separate divisions, one for horses and the other for cattle, and that each division should have its own set of accounts and its own reserve fund, but both should be under the same management. The object of this is the correct and equitable adjustment of premiums. (2) That single animals should not be insured, but that the whole live stock on a farm, within certain specified age limits, should be included in the insurance. (3) That on the commencement of an insurance there be paid (besides the premium paid in advance) a registration fee, to be applied to the formation of a reserve fund for each division. (4) That compensation be not paid in full for losses, but that the insurer take a small part of the risk himself. This is arranged by deducting 20 per cent. from the gross amount of the compensation, and is intended to ensure the careful treatment of insured animals, and to keep premiums down.

The Department of Agriculture consider it inadvisable to start a mutual insurance society for less than about 50 to 100 horses and 200 to 300 cattle. They advise the limiting of the insurance to direct loss caused by the death or necessary slaughter of horses or cattle on account of illness or accident. The society should be managed by a small committee chosen from among the members, and they should have the power to ask a higher premium from farmers who use their horses for dangerous work, or whose cattle graze on very hilly ground, etc. It is recommended that the maximum sums for which horses and cattle can be insured should be £55 and £14 respectively.

A Long-lived Merino.

Mr. H. F. Evens, Sheep Inspector, Mount Currie, forwards a photo of a Merino ewe, a pet animal belonging to Mr. T. T. Joyner, of Glen Edward, Mount Currie. This animal died in October last at the age of eighteen years. This is claimed as a world's record. We have no data on the subject, but possibly some of our readers may be in a position to offer some information.

Seaweed as a Manure.

A Queenstown correspondent writing to Dr. C. F. Juritz, the Senior Government Analyst, on the above subject, says:—A few days ago I saw a notice in a newspaper of an article by you on the manurial value of seaweed. You referred also to the Channel Islands. Much of the little knowledge of chemistry that I have was acquired during some years' residence in the Channel Islands. I have for long been of opinion that we should utilise our seaweed, and I have already spoken of it. We are a wasteful country. I have not by me the article referred to, but at the time of reading I noticed one or two statements which might at least be added to. There were, when I lived in the Channel Islands, two days in the year at intervals of six months set apart by authority for the two seaweed harvests—two of the principal spring tides. These were almost public holidays. Seaweed was reaped, collected on shore, and later carried—in a moist state— put in heaps as dung over the fields, and later spread and dug in.

But another use is also made of it to which you do not I think refer, and a very important one. Large quantities are dried on the beach, later stacked, and becomes the principal fuel of the peasants. When I lived in those Islands there were no chemical works as we should understand them, but the principal local chemists would send round to the farmers for the seaweed-ash, paying a nominal sum only. You are of course aware that all marine algæ contain more or less iodin, and this remains in the form of potassic or sodic iodide, with other things in the ash. Water soon extracts these, and the crude salts result. But I can assure you that I have seen, on local industrial shows, the pure iodine bromine and all the iodides of commerce. These from the simplest apparatus. It appears, therefore, to me that much might be done by the poor whites and others. I fear private enterprise would not undertake such work for some time, but something might be tried at small cost by Government, and from results private enterprise would work. I have been about 27 years in the Colony, and came from the Islands with only a year's interval.

Australian Salt Bush Seed.

Mr. H. Alston, of Van Wyk's Vlei, writes stating that he can supply Australian Salt Bush seed (*Atriplex halimus, L.*) as gathered in pod, in parcels from 2 lbs. to 5 lbs. weight by post on receipt of remittance of 1s. 6d. for each pound. He has been reluctantly compelled to give up his former system of distribution, as the Railway Department refuses to forward seed unless prepaid. Those requiring bulk consignments must bear this in mind, and in ordering be careful to enclose cost of carriage from Carnarvon Station with remittance. It is manifestly impossible for Mr. Alston to know all the rates to the different states and stations, and collect the charges from applicants spread over the whole of South Africa.

Ostrich Parasites.

Mr. P. M. Southey, of Montagu, Norval's Pont, writes:—Your last issue contains a very interesting article on the treatment of ostriches for wire and tape worm by W. Robertson, M.R.C.V.S. This subject is of very great importance to the ostrich farmer; we must therefore beg leave through the medium of your journal to thank this gentleman for the interest and trouble he is taking to cope with these parasites. I will endeavour to follow up these remedies and let you know the result. Mr. Robertson has omitted to state the different doses for the respective ages, and there is another point I should like to be clear about. Is five hours sufficient interval between the paraffin and sal ammoniac, as apparently Vet. Surgeon Armstrong's treatment differs from Mr. Robertson's. Mr. Robertson states: "I starve the birds and give a dose of paraffin. Five hours after I give an ounce of lime in half a bottle of water, followed at once by an ounce of sal. ammoniac in another bottle of water." Vet. Surgeon Armstrong, in November, 1905, said:—"Finding that the mixture of paraffin oil and carbolic acid failed in the double object aimed at, we tried them separately. Our first experiment was only partially successful, as we administered the carbolic acid twelve hours after the paraffin oil, which proved to be too short an interval. The paraffin had not cleared off the whole of the gelatinous layer from the surface of the mucous membrane, and in consequence the carbolic acid had failed to kill the whole of the worms. It was satisfactory to find, however, that wherever the worms were exposed, the carbolic acid had acted upon them effectually. Our subsequent experiments taught us that the paraffin oil must be completely cleared out of the stomach before the carbolic acid is administered, and that this was effected more readily by allowing the birds out to feed at least 24 hours after administering the paraffin."

Now it appears to me that getting well rid of this mucous membrane is most essential, thereby leaving a good clean surface for the lime and sal. ammoniac, and giving free access to the lining of the stomach. If Mr. Robertson will be good enough to state his reason I shall be very grateful. I take it the dose as laid down by the latter gentleman is for 18 months old birds. I may mention that last season's chicks, three months old, were badly infested with wire worm, when paraffin oil and carbolic acid had a marvellous effect by greatly improving the condition of the birds. Of course, no birds were destroyed for examination purposes, therefore I am unable to state that the parasites were totally eradicated.

Transvaal Brands Directory, 1907.

We have been favoured with a copy of the Transvaal Brands Directory for 1907—an excellent work, which reflects the greatest credit on the Transvaal Agricultural Department. For some years past a general system of registering all Stock Brands has been in force there, and judging by the Directory before us, would seem to be working well. The method adopted is that known as the "Three Piece System," and under it will be found registered brands from every ditsrict in the State, including even native locations. The great advantage of the "Three Piece System" is that no two persons can possibly have the same brand. At the same time it is a really sound method for tracing stock of all descriptions. It is to be regretted this system has not been introduced all over South Africa, as it would prevent a great deal of the stock-stealing which now goes on.

Money in Lucerne.

The Midland News Printing and Publishing Co., of Cradock, has re-published its well-known work on Lucerne Culture, greatly enlarged and with many additional attractive features. It has been given a new title and a new dress, and is now known as "Money in Lucerne: The Last Word in Alfalfa Culture, by South African Experts and Practical Farmers." This comprehensive title is very fully justified, for the work in question brings us right abreast of the times on every phase of the subject. The information is sound, the illustrations are good and well printed, and there is an absence of over-statement which frequently disfigures works of this description. It has one great advantage in being pre-eminently practical from end to end, and it has another in being the only work extant on the subject written from the standpoint of South African experience. As a practical handbook it should be in the possession of every farmer—not only those who cultivate lucerne and those who contemplate doing so, but particularly those who have no acquaintance with the subject. We trust to hear of it enjoying a wide sale..

Maize and Oats.

The following report has been compiled from advices received by the Superintendent of Agricultural Co-operation setting forth the conditions of the markets on the 14th ultimo.

London.—Maize.—The market has recovered considerably during mail week owing to the limited supplies and keener demand. It is not considered that prices will remain high very much longer. The crop in South Russia is quite the largest on record, 7,000,000 qrs. of which will be available for export. The stopping of navigation will limit supplies coming forward freely in the near future, and for the present, values, it is thought, are fairly safe. Prices, c.i.f. per 480 lbs.:—

	s.	d.
La Plata, afloat and loading	27	6
,, November	26	9
Mixed American, December	26	3

Oats.—The market has declined during the week owing to the falling of the demand, a considerable trade in English oats having been secured during the last 10 days. Threshing is at its height, and stocks are fairly heavy. South African oats have been bid 14s. 3d., and met no response. Prices, c.i.f., per 304 lbs.:—

	s.	d.
La Plata, afloat	15	0
,, December	14	9
,, January—February	14	6
South African	14	3

Southampton.—There has been quite a steady trade in maize during mail week in the United Kingdom, and prices were fully maintained for near positions. Wheat of all descriptions is rather dearer, and oats are steady. South African oats should command some attention this year if they can be bought on a competitive basis. At present Argentine oats are a little better in demand and a little lower in price, and there is certainly some prospect of business with South Africa in the near future.

Machinery at Thebus—For Sale by Tender.

The Public Works Department is calling for tenders for the purchase of a whole lot of valuable machinery and plant now at Thebus, on the site of the Irrigation Works. The tenders must be in the hands of the Controller and Auditor-General not later than noon on December 31st. The machinery includes an 8 h.p. vertical steel boiler, a five-ton locomotive steam crane, a 3-ton steam derrick crane, a 3-ton hand derrick crane, a 12 h.p. double cylinder portable engine by Davey, Paxman and Co., 3 saddle tank locos, a 5-ton Aveling and Porter steam road roller, an 8-ton ditto, and a quantity of crane skips, side tipping wagons, rail trolleys, etc.

The Destruction of Rats.

In the November issue of the *Agricultural Journal* mention was made of the preparation known as "Ratin" which is said to be most effective in getting rid of rats. Since that issue was published we have been supplied with a copy of the report on experiments made with the preparation by the Department of Public Health. Rats in confinement fed with it, consumed it with great greed. No results followed, and the rats are still alive and look well. The preparation was also strewn about in the unclaimed goods shed at the Cape Town Docks, with no better results. Several pieces of the Ratin were found to have been eaten or carried away, but no dead rats have been found, and so far as could be judged, the number of rats in the shed has in no way decreased. These experiments were started in September last.

Caustic Soda and Sulphur.—A Disclaimer.

It having been brought to the attention of the Department of Agriculture that use is being made of Government Notice No. 1100 of 1908, on the above subject, for trade purposes, by private business people interested in the sale of dip ingredients, the Department wishes it to be fully understood that the instructions contained in the abovenamed Government Notice have no reference whatever to any particular make or brand of the ingredients there enumerated. Any attempt to give people that impression, is therefore hereby repudiated.

Colonial-made Gates and Fences.

We had the pleasure quite recently of going over the factory started by the Premier Gate, Fence and Seed Co., Ltd., in Capetown. It is a busy spot, being throughly well equipped with the latest appliances for the construction, on a large scale, of tubular gates, jackal-proof and other woven fencing. There seems to be a future for this industry judging by the number of hands employed, the excellence of the plant and the high class of work turned out. One great feature of the business is the reasonable charges at which the output is placed on the market. Full particulars can be obtained of the company, 26, Hout Street, Cape Town.

FARM AND VELD.

Draaibosch or Gombosch Seed.

This Department now has a small quantity (4 lbs.) of the well-known Draaibosje or Gombosje *(Diplopappus filifolius)* seed for distribution. It is especially recommended to sheep-farmers of the grass veld districts of the Colony, to serve as fodder during the winter months and times of excessive drought, when the grass makes no growth. This bush is recognised in many parts of the Colony as being one of our best bushes. The analysis of draaibosch as compared with that of oathay is as follows:—

	Water.	Air Dry. Digestible Carbohydrates.	Albumenoids.	Inorganic Salts.	Cellulose
Draaibosch	7·21	64·75	2·30	9·96	15·78
Oathay	15·0	42·04	10·2	6·2	27·8

As this seed is costly and most difficult to collect, it can only be distributed to such farmers as are willing to enclose the land where the crop is to be established and to give the bush some attention until it has once established itself, when it will be able to take care of itself.

Paspalum Dilatatum and Clover.

C. F. Julius, of Central Bucca, contributes the following to the "Agricultural Gazette of New South Wales":—"The necessity of providing some auxiliary grass in our predominant paspalum pastures is yearly becoming more evident. The excellence of paspalum as a good strong reliable grass under every circumstance has been already proved, and it deservingly holds with us first place. Yet it is such a disappointment to the stock owner that, even with abundant paspalum, something seems lacking to make a complete grass feed for his stock; while, in the spring, paspalum does not respond as promptly as could be desired, and therefore we are at this season continually at a disadvantage, and unnecessarily so. To make a perfect ration, paspalum requires the addition of some leguminous crop, such as lucerne, cowpeas or clovers; and passing over the first two named as presenting some difficulties in cultivation, we come to clover, and in clover we see the promise of certain relief. Whilst almost every other grass is compelled to give way and perish before the development of paspalum, it is remarkably noticeable that clover is almost, if not altogether, the only exception to the rule. This delicate-looking plant, the joyful herald of spring, seems to find in the midst of the paspalum stronghold a protection for its own bloom.

Surely 'out of the strong comes forth sweetness,' in other words, if paspalum is 'king' of the gramineae, may not clover be termed the 'queen' of the leguminosae. In any case paspalum seems to cherish the society of clover as its necessary consort, and the sight of a strong combined growth of paspalum and clover has often aroused much wonderment in the beholder. Probably paspalum cultivates a clover growth for the sake of its nitrogenous element. However that may be, the paspalum grower should adopt nature's suggestion, burn his old paspalum paddocks, and sow clover—white clover preferably—also in every new sowing never omit a proportion of clover seed."

"Neither paspalum nor any other grass or fodder plant, adds the "Gazette," is a complete food for production of meat or milk. It is a badly balanced ration, and must be supplemented by some leguminous plant. At the present time the paddocks along the Tweed and Brunswick Rivers, and less strikingly in the Richmond River district, are white with clover blossom, and all cows on such mixed pastures are doing well—if they are watched and not allowed to take too much clover and get "hoven." All dairy farmers, who find that paspalum has taken complete possession of their paddocks, should sow 3 lbs. of White Dutch Clover, and 1 lb. of Perennial Red Clover per acre. If clover does not thrive, it will pay to top-dress with 5 cwt. of lime per acre. Lime made from the burning of shells will probably be cheaper, and quite as effective as stone lime in the coastal districts. Dairy farmers cannot be too strongly urged to sow a legume with every fodder crop, vetches with barley, lucerne or red clover with oats and wheat for hay, cowpeas with maize and teosinte. To supplement the fodder, increase the feeding value, bring mineral matter from the sub-soil with their deep roots, gather nitrogen from the air by means of the bacteria in the root-nodules, furnish a second bite of green food after the main crop is cut, and improve the soil both mechanically and chemically, giving a richer and more friable sod for the succeeding crop—whether roots or grain. Study the composition of the best pastures—natural and artificial, and you always find trefoils, medic, vetches, or clover present. Learn the lesson, and put it into practise."

Case of Anthrax—"Meltziekte"—in an Ostrich.

It has been generally supposed (writes Mr. W. Robertson, M.R.C.V.S., F.R.S.E., Director Veterinary Laboratory, Grahamstown), that the ostrich, in common with the Avian tribe, possessed an immunity (under natural conditions) to Anthrax; this would appear not to be the case. The diseases of the ostrich under domestication are being studied at this Laboratory, and the subject of this note was a full-grown hen bird (one of seven) in a wire-fenced kraal. These seven birds had been under observation for seven weeks, the kraal was a clean one and no case of spontaneous anthrax has occurred in the station since its commencement fourteen years ago. The birds were noticed to feed well in the morning, the ration being mealies and prickly pear leaves, and were seen by the manager at mid-day. At 2.30 p.m. one was noticed to be lying on the ground quite dead with the head and neck twisted back over the body. *Post-mortem* was made at once. Blood was quite fluid, and the muscles twitched under the knife. The intestinal tract was almost empty (the crop being full) and congested from end to end. The mucous membrane was much congested, and covered with minute areas of hæmorrhage, and

the lumen of the intestine contained a quantity of clear mucous streaked with blood. The spleen was much enlarged, soft and dark in colour. Smears from the blood showed a pure culture of a bacillus identical, morphologically, and in staining, characteristic with those of anthrax, and a slide was submitted to Sir John McFadyean, who corroborated this diagnosis.

Wireworm in Sheep: An Arsenical Remedy.

H.C.v.R. writes, giving the following as a commendable remedy against "wireworm in sheep." Take 2 ozs. of washing soda, 1 oz. of arsenic, well dissolved in warm water, and two spans of good "loogtabak" (lye tobacco). Put this in four gallons of boiling water, leaving it there for fifteen minutes. As soon as it is well settled and cooled it may be administered. Dose for full-grown sheep: as much as two small Dutch medicine bottles can contain; for young sheep a smaller dose. Wherever this remedy has been administered, it has proved to be a genuine remedy. Before administering, strain it through a cloth. Loogtabak is the usual Oudtshoorn roll tobacco, which is moistened with some lye mixture for sweating purposes, hence its name "loogtabak." Any South African farmer knows what it is. The contents of a Dutch medicine bottle is $\frac{5}{8}$ of an ounce of liquid.

Mr. R. W. Dixon, M.R.C.V.S., of the Veterinary Branch, offers the following comments on the above:—Cooper's Dip Powder, which is a compound of arsenic, is extensively used in this Colony in the treatment of tapeworm affecting kids and lambs, the dose being one teaspoonful for ten young sheep. A teaspoonful of Cooper's Dip weighs about 135 grains, which, according to analysis, contains 29 grains of white arsenic, therefore the dose is practically 3 grains of arsenic for each sheep, a full grown sheep may get 4 grains with safety. The contents of the Dutch medicine bottle is computed to be about $\frac{5}{8}$ of a fluid ounce, therefore the full dose of arsenic contained in two Dutch medicine bottles is under one grain of arsenic, for each fluid ounce of the solution prescribed above contains only 0·68 grain of arsenic. Our experiments with solutions of arsenic given much stronger than that recommended by Mr. Van Rooy for the treatment of wire-worm have not given such satisfactory results as blue-stone solution. Possibly the tobacco assists to destroy or expel the wire-worm.

Report of Occurrences of Red-winged Locusts.

Mr. E. B. Hoole, of Mapuzi, Old Morley, writes:—I have taken great interest on the above subject, and have much pleasure in recording an account of my observations for the last fifteen years on the coast between Bashee and Umtata Rivers. The locust that generally visits us is the "Red-winged species," which come down from the interior in vast swarms during the months of April and May. Owing to the great amount of vegetation (tembookie grass), bush, and forest which clothe the coast belt, I notice they locate themselves first in the forest, where they remain for a period of nearly three months, when they emerge early in August or September, and commence swarming, directing their flight in a north-westerly direction, returning again in November, travelling in an easterly direction towards the coast in not so compact swarms as when they left, but more divided and covering a greater area. I may mention that I notice when the swarms leave for the north-west they invariably travel

in the same line of direction year after year. So much so is this the case that I have noticed that mealie lands lying a very short distance out of their course have never been touched by them. Upon returning, the locusts become very restless, looking out for suitable soil to deposit their eggs. Should they encounter hard sandy soil, they deposit eggs very thickly; but should it be damp and clayey, their eggs are deposited over a large area.

I don't think there is any fear of an increase of locusts along the coast belt from natural causes. They have too many enemies. I am doubtful if half of the eggs deposited are ever hatched: (1) Owing to the stiffness and dampness of the soil (zuurveld); (2) to ants and other ground insects preying upon the eggs; (3) when the young are hatched after spring rains, they become a prey to all smaller birds. It is now the corn-devouring birds recompense the farmer for the destruction of grain in its season by devouring the young locust, as they have neither grass, seeds, berries, or corn to live upon. All birds ought to be looked upon as friends of the farmer, and enemies of locusts, and more especially the "Brown Hawk with his 'V' tail (Dutch name, Kaken Valk; Kafir, Ntyoyieja)" Owing to his habit of catching his food on the wing. I have timed this hawk, and found him to catch 50 to 60 locusts per minute. He stores his food for winter in hollow trees. Another peculiarity of this bird is—it loses all its feathers while lying dormant during the winter. I recently came across one of these birds in its winter quarters, where I found he had collected thousands of locusts, grasshoppers, beetles, grass snakes, lizards, toads, and a few chickens. Surely this bird ought to be better protected, being both a vermin killer and scavenger. I will be pleased to communicate to you any further observations I may make, as I consider the subject one that every person ought to do what he can to facilitate the extermination of this terrible plague to our agricultural industry in this Colony."

Spraying Pear and Apple Trees with Arsenate of Lead.

Mr. N. S. Pillans contributes the following on spraying of pear and apple trees with arsenate of lead, which, he thinks, might be useful to those who have not tried it. He writes:—Will you ask your readers who use arsenate of lead against the ravages of the Codlin moth, to try spraying their trees in the early morning while the dew is yet on the trees. I have found from experience that when the spray is applied while the blossoms are yet damp, the whole of the mixture that falls upon the blossom at once descends into the *receptacle* of the flowers and remains there. But when the blossoms are dry, the greater part of the spray settles in small drops upon the *anthers* of the flower and hardens them, without doing the good intended, for it is at the base of the receptacle that the moth deposits its egg and where the worm is to be poisoned, so soon as it commences to eat into the apex of the young fruit at this time of the year and not on the sides of the flowers.

Freak Eggs.

G. M. Henderson writes, forwarding the photograph of a freak egg of a peculiar nature. It is almost the shape of a fowl, and seems to be one or more undeveloped eggs forced together. It was laid by what its owner (Mr. Boonzaaier, of Woodstock) described as an ordinary Cape hen. The shell, we are told, which was very brittle, was, unfortunately, fractured on the under portion.

The freak egg is not nearly so uncommon as some people imagine. Such occurrences are usually due to the over-stimulation which the high feeding of the domesticated fowl forces on to the egg-laying organs of the bird. They do not, as some suppose, indicate deficiencies, but are really due to one section working at a greater rate than another. "Soft-shelled" eggs, for instance, are entirely due to over-stimulation, resulting in an excess of ova-forming matter. As the eggs are continually advancing, two may drop into the oviduct on the same day. One only receives its coating of shell, and, naturally, the other is laid minus its covering. The same cause will give rise to what is known as the double yolk. The two eggs, as above, fall into the oviduct together and become encased in one shell, each with a complete white and yolk of its own. The case mentioned by our correspondent seems to be a variation of another form of freak. It takes about twenty-four hours for the shell to form, but sometimes a second ovum rests against the first just before the latter is laid and, when complete, it presents a crooked dented, or even flat shape—according to the position in which it has rested against the other. Stimulants, such as condition powders, are usually the cause of these abnormalities, and they can also be brought about by improper feeding—over-feeding one day, protracted starvation the next, and so on.

Preserving Eggs.

A correspondent in the Bloemfontein *Post* gave the following recipe for preserving eggs: Take the eggs while still warm, and gently rub them all over with butter—not a great deal and not thickly, but enough to close all pores—then pack in coarse salt. On this the Harrismith paper states that a few years ago a lady residing in that town, buttered several dozen eggs in the above way, and packed them in salt in a barrel. In due course the eggs were used and two years later the barrel was again requisitioned for the same purpose, but in packing away fresh eggs, two of the former eggs were found. On breaking them open, it was discovered they were as fresh as newly-laid eggs, and they were used in a pudding that day

---

Artificial Clouds to Protect Vines from Frost.

How the French grape-growers protect their vineyards from frost by producing artificial clouds is described by Consul Murphy, of Bordeaux: "The process, the invention of Edouard Lestout, of Bordeaux, consists of filling small wooden boxes, open at top, with an inflammable composition consisting of a mixture of equal parts of resinous with earthy matters (clay, terra alba and the like), reduced to fine powder and pressed into a compact mass.

"In the centre a wick extends through the compound and serves to kindle it. The wick, however, may be dispensed with and the composition ignited by pouring a few drops of alcohol, petroleum or other inflammable oil over the mass and applying a match. These boxes, about eight inches long by six wide, made of pine wood ordinarily, are placed in line, about 30 feet apart, around certain areas.

"So far as the grapevines are concerned, the most dangerous period of the year is in April, when the young shoots are showing some vigour and the juices running freely. Then a slight frost may mean disaster unless the plants are protected in some way. There is but little danger when a dark or cloudy morning follows a cold night. The trouble comes when

the first rays of the morning sun strike the almost frozen and unprotected plant. By the Lestout process a dense cloud of smoke is produced, hanging over the vineyard long enough to protect the plants from the sun's rays and give them a chance to recuperate from the dangerous effects of the frost.

"The composition in the boxes to windward only is ignited, the thick, black, heavy smoke hanging over the field forming a shield against the sun's rays. The inventor declares also that his process may be used for masking the movements of an army, hiding the erection of field works; also as a rain producer, and even for driving off grasshoppers and locusts."

The History of the Meat Industry.

A lecture on the History of the Meat Industry was given at the College of Agriculture, Edinburgh, on November 2nd, by Mr. Loudon M. Douglas, of Edinburgh, well known as a writer and lecturer on the subject of foods and the various branches of industry associated with the meat trade. There has been a strong effort made within the last year or two to place the meat industry, in common with other skilled occupations, upon an academic basis, and this series of lectures is the first step towards accomplishing that desirable end. The occasion of the lecture was the inauguration of a winter course, which will be delivered by Mr. Douglas at the same place. These lectures will deal with Cattle Markets, Abattoirs, Refrigeration, the Meat Supply, Laws Affecting the Meat Trade, Meat Inspection, Diseases of Animals used for Food and their detection, Pickling and Curing of Meats, the Manufacturing of Small Goods, etc., etc. It has also been arranged that a number of excursions to different places in connection with the meat industry will be made so as to study the actual practice as carried out. In the opening lecture, Mr. Douglas referred to the great importance of the subject and the total absence of any systematic method of teaching it. The meat industry in all countries had sprung up in the most casual way and its origin rests in obscurity. The ancient laws on the subject were now obsolete, but no doubt called for, at the time they were enacted. The number of substances obtained from a bullock are numerous and are applied in many departments of industry. It is necessary, therefore, that we should know more about them. No doubt the food used by various nations suited their habits, but there must be some law governing the whole. Various specific instances of curious customs were given by the lecturer, who also illustrated his points with a wide range of lantern slides.

In so far as the history of the meat industry is concerned, Mr. Douglas traced it from the earliest time to the present day, and made many interesting references to old laws and customs. The Trade Guilds were specially interesting, and they had been strong in Scotland, but their influence was also extensive in other countries. They had been done away with however, and were now represented, so far as the United Kingdom was concerned, by a National Federation of Meat Traders' Association, whose duty it was to foster and develop technical education throughout the trade. The lecture was attended by the President of the Master Butchers' Association of Edinburgh and all the officers, who were accompanied on the platform by Professor Wallace of Edinburgh University, and Judge Macpherson, who occupied the chair. The proceedings were very enthusiastic throughout, and the lecture was much applauded, as were also the appreciative speeches which followed its delivery.

The Flax Industry.

The plants yielding fibres are exceedingly numerous in South Africa (writes the Director of the Port Elizabeth Museum) and, moreover, the soil and climate is of such a nature that most of the fibre-yielding plants of other countries can be grown here. Flax is the most valuable of all, and recent experiments by a citizen of Port Elizabeth have amply demonstrated that it can not only be grown without any trouble upon comparatively poor soil, but that it equals in length, and as far as I can ascertain, is as good in quality as the best Irish flax. The growing of flax and the weaving of it into various textiles, etc., ranks amongst the most important industries of the world, and in Ireland alone it affords employment in a direct and indirect way to large numbers of people. I have talked with Irish farmers about it, who all declare that it is a profitable crop to grow, and I have been through the biggest linen factories in Ireland and seen thousands of men, women, youths, and girls happily and profitably employed in the various processes of providing the world with clothing and its accessories.

Now, why is it not possible to grow, spin, and weave flax here in the Colony, and produce most of our linen goods, threads, etc.? A factory would give employment to large numbers of white and coloured people, and there seems no serious objection why goods could not be produced and put on the market cheaper than the home-spun article, seeing that such goods would be free of freightage and import dues. The tendency in the past has been to charge for inferior Colonial products as much as the very best quality manufactured abroad, and the cry is raised that the people are unpatriotic and refuse to patronise products manufactured in the country. Manufacture good stuff and sell it at a more reasonable price, and a good steady demand will arise. Coloured labour is just as cheap here as white labour in the United Kingdom, and much of the work could be done by this section of the community. There is an unreasoning prejudice in the minds of many people against the employment of coloured labour, but when cheap labour is necessary to make any particular industry pay, then such labour should be employed, for be it remembered that the prosperity of the coloured people means prosperity for the Europeans. Coloured people live in houses, eat food, wear clothing, and indulge in various luxuries according to their means, and it is the European who mostly benefits.

Even away back into pre-historic times when our ancestors were the rudest of savages using roughly-hewn stones as implements, we find evidences of them having cultivated and used the flax plant as a textile, as is proven by the discoveries made in connection with the Lake Dwellers of Switzerland. In the Old Testament there are frequent references to flax, and it is found in great quantities in the old Egyptian tombs. In the various museums abroad I have seen many hundreds of the mummified remains of Egyptians wrapped in strips of various qualities of linen cloth. I have in my possession samples of very fine and coarse linen taken from a mummy at Owen's College Museum at Manchester. The records found with the mummy show that it was over 4,000 years ago when the spirit inhabited that shrivelled linen-wrapped and bitumen-smeared body. These samples of cloth can be seen in our Museum.

IRRIGATION BY PUMPING IN GRIQUALAND WEST.

THE ADVANTAGES OF SUCTION GAS.

By F. B. Parkinson, Assoc. R.S.M., F.R.G.S.

So much has been said and written on this subject, and so many failures have occurred, that most people look with grave suspicion, or even entire incredulity on the profitableness of irrigation by pumping. Apart from the pumping plant itself there are so many elements that must be rightly combined to make a success that very often the wrong causes are assigned to a failure, and so prejudice an industry, the possibilities of

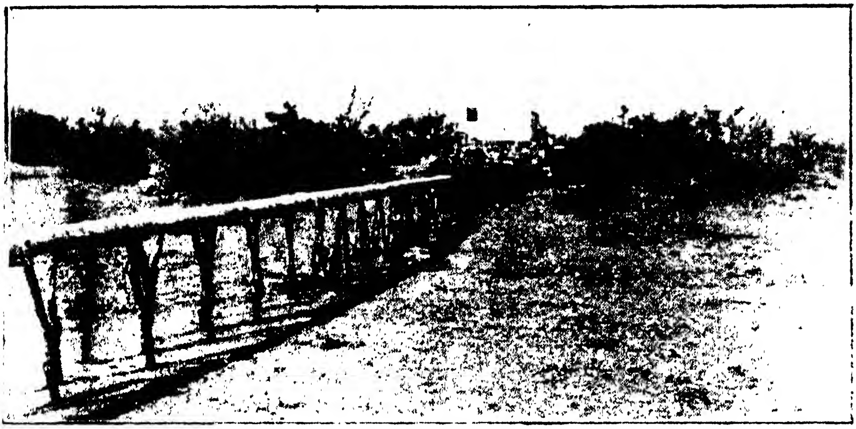
The Intake.

which are enormous. The Reids Drift Land Co., Ltd., have erected a pumping plant about four miles below the junction of the Vaal and Orange Rivers for the purpose of lucerne culture. It is pleasant, then, to be able to describe an installation that promises success, and as a primary step towards this the Reids Drift Land Co. have wisely placed their large estate of 400 square miles under the energetic and able management of their own Chairman, Mr. W. Graham McIvor. In designing a plant

such as this, the entire arrangement must be so modelled as to suit the conditions of the spot, which, in the present case, are briefly these:—

GEOLOGICAL FEATURES.

The irrigable land consists of a strip of deep rich alluvial soil on the west bank of the river of over 300 acres in extent. Of these 200 are already ploughed and are so level that very little work is required in



General View looking towards River.

preparing the lucerne beds. The balance of the land will be gradually brought under, so that after about three seasons the whole area will be irrigated. To the west of the lands rises the escarpment of the Kaap plateau, consisting of horizontal beds of dolomite, quartzites and schists, with the area between the lands and the hills almost entirely covered with

Lands—Showing Furrow.

Dwyka conglomerate. These geological features bring many important influences to bear upon the irrigable land, among the chief of which are:—

(1) The waters flowing over and through the dolomites bring quantities of lime that, during past times, has enriched at least the upper layers of the alluvial soil with this valuable material

(2) This same lime has had a "case-hardening" effect on the dwyka conglomerate and has fitted it for the growth of a thorny shrub, and these two effects prevent uncontrollable quantities of silt being brought on to

Engine and Pump House.

From the Engine looking towards the Shaft, showing Idler and Ropes.

the land, and also the west winds do not become such devastating hot sand blasts as they do when blowing over loose ground.

Site of Pumping Plant.

It was found that all along the river frontage the banks were some 5 feet below high flood level, so a point was chosen opposite the deepest part of a pool half-a-mile long, and it so chanced that this was within 800 yards of the up stream end of the lands, and with a lift of 58 feet this upper portion could be easily irrigated and a fall of 21 feet obtained to the lower end three miles distant.

Piping.

Seeing that the point to which the water had to be raised was over 600 yards from the river, the question of pipes was serious as regards capital expenditure. It was determined that as 40 feet of the lift took place at the river bank, a thin pipe would be sufficient across the greater part of the distance where the pressure was small. Rivetted steel galvanised pipes 3-32 in. thick have been used: they were made in five sizes,

From Shaft looking towards Engine, showing Rope Drive.

advancing by half-inches from 12 ins. to 14 ins. diameter so that they could be packed in nests of five for shipment. The remainder of the pipe to the intake is of rivetted steel 12 ins. diameter, and ¼ in. thick. The friction of the whole system of pipes brings the total lift to 70 feet. After leaving the pipes, the water is carried in open troughing of galvanized steel 27 ins. in diameter, having a fall of 7 feet per mile.

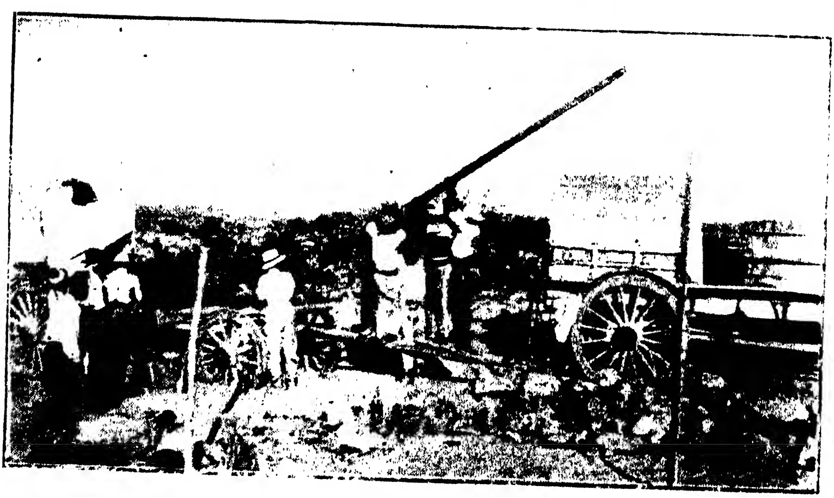
Masonry and Earth Works.

A shaft 7 feet diameter was sunk 135 feet from the water's edge and masoned out with stone and cement. From the bottom of this shaft a tunnel was driven out to the river to receive the suction pipe. The foundations of the engine were raised 7 feet, and round these a strong retaining wall was built. The shaft masonry was carried up to this level also, so that no ordinary flood can reach the machinery.

MACHINERY.

This consists of:—A Crossley suction gas engine 72 B.H.P. of the electric lighting type. Single flywheel 8 feet diameter, weighing 12,000 lbs., suction gas producer and scrubber. A high lift turbine pump by Mather

Producer, Scrubber and Circulating Water Tank.



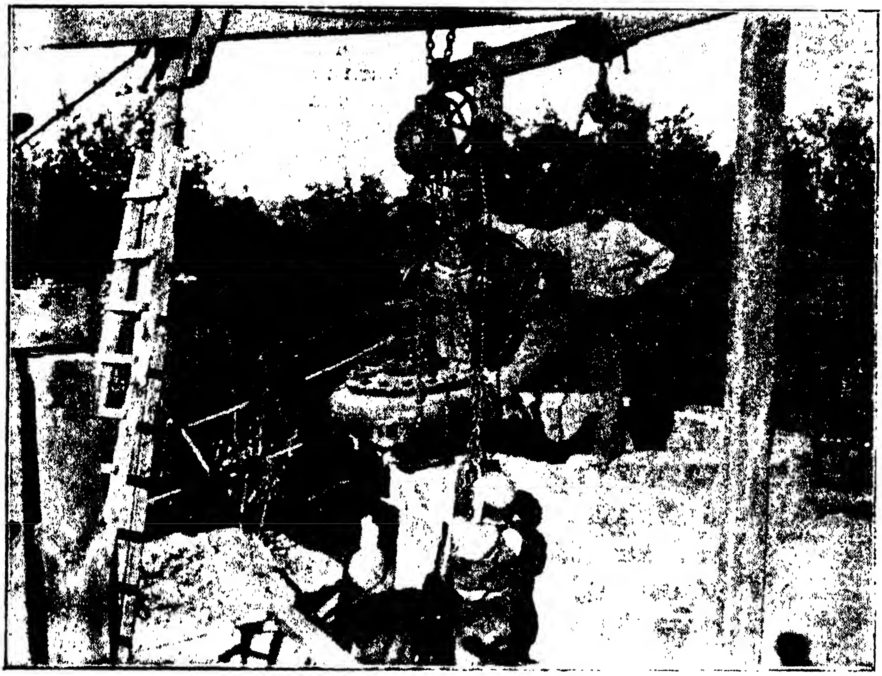
Off-loading Fly Wheel.

and Platt, delivering 1,350 gals. per minute with engine running at 180 revolutions per minute and 2,000 gals. per minute at 210 revolutions per minute. This is driven by a vertical spindle hung on ball bearings from a power head on the top of the shaft so that none of its weight rests on the

pump and transmits its power through flexible coupling. The spindle is supported laterally by six journal blocks bolted to steel girders that are rigidly masoned into the shaft walls. Five 1 in. cotton ropes transmit the power from the flywheel to the horizontal pulley on the pump spindle. These are assisted in their "quarter turn" by a straining pulley on the slack side half way between engine and pump.

Water Circulation System.

This is so arranged that there are three sight feeds in a conspicuous place in the engine house for the generator, scrubber, and cylinder jacket, thus enabling the driver to control these various waters without leaving the building. These feeds are supplied from a common tank kept full by a pipe and ball tap from the rising main. A saw bench is placed at back of power house and driven by a 1 in. manila rope. This serves to cut up the timber used for making charcoal.



Pump ready to be lowered into Shaft.

Charcoal as Fuel.

The Director of Irrigation of Cape Colony in his report for 1907 foreshadows the use of charcoal for suction gas plants when he says, at page 33: "It has been satisfactorily demonstrated by actual practice in this country that such plants can be successfully and economically run on charcoal burnt by farmers on their own farms from Mimosa, Kameeldoorn, Guarrie and other woods. Where this can be done the fuel costs are absurdly low." There being an abundance of wood available, it was determined to run the suction gas plant with charcoal, and this has now been done with complete success. The following details with regard to

the process employed for making the charcoal and experiments in connection with it may prove of interest. The wood is cut into lengths of eighteen inches, and logs of over six inches diameter are split lengthwise. A central chimney one foot square is built of crossed sticks six feet high, and round this chimney the wood is packed on end in four tiers, making a hemispherical heap twelve feet diameter and six feet high. The heap is then covered with wet clay all except the chimney at the top, and into this some glowing coals are thrown. As soon as the wood is well alight, the chimney is closed and a ring of holes about one inch diameter is made with a crowbar, about three feet from the top. As carbonization proceeds, the top of the heap caves in and must at once be thickly covered with sand, and other holes made lower down, so that in about 36 hours the process is complete. This is simply the ancient way of making charcoal in heaps.

A number of such heaps were all ignited on the same day and afterwards exposed to exactly the same conditions, and it was with this charcoal that the following experiments were made. The different kinds of wood were carbonized in separate heaps. All the charcoal worked excellently in the producer; good gas could be got in four minutes with fire previously lighted, or in 15 minutes starting all cold. The gas is colourless, odourless, and tasteless, thus requiring a little more care than with anthracite to avoid its poisonous effects when inhaled, but from its being practically free from sulphuretted hydrogen and tar it has less deleterious effects on the engine than even good town gas. The clinker is brittle and friable, causing no trouble in the boshes or on the firebars of the producer, so that much poking is not necessary, and once in 12 hours is quite often enough to open fire door for removal of clinker. In short, good gas can be maintained with less trouble than with anthracite, in spite of the more frequent filling of the hopper, owing to the greater bulk of charcoal.

ADVANTAGES OF CHARCOAL MADE FROM WILLOW.

Among the different kinds of charcoal tried was that made from willow wood, and it was found to possess certain useful properties. On weighing and measuring the charcoals it was found that the relative volumes taking willow as unity were: Willow, 1·0; Kafir Thorn, 0·688; Karree, 0·683; so that willow charcoal may be taken as one-third greater volume than that made from the hard woods, and one would expect that it would require feeding one-third faster into the producer. On trial, however, it was found to be consumed only a little faster than the hard charcoals, volume for volume. Analysis shows clearly why this should be. Assaying the charcoals in the usual way the following average results were obtained: —

	Willow.	*Kafir Thorn.*	*Karree.*	
Water	2·25	2·18	3·08	per cent.
Volatile matter	8·73	12·82	26·92	,,
Carbon	85·5	81·84	66·92	,,
Ash	3·52	3·16	3·08	,,
	100·00	100·00	100·00	

The water measured in the results was that driven off from ·5 gramme of finely-powdered charcoal dried for one hour at the boiling point of water in Kimberley, which would be about 205° F. On distillation, the total water was found to be much higher. For instance, karree gave 7·8 per cent. and willow 6·6, so that in the above assays the volatile matter appears unduly high. Much of the volatile matter is, of course, occluded

gas, such as carbon dioxide, which would be driven off in the upper part of the producer and have no thermal value in the engine. Particularly is this so with hard wood charcoal, as is shown by the following results got by distilling at a barely visible red heat, so that the temperature was far below that required to form carbon monoxide:—

Willow	yielded 33·6 vols. gas.	at barometer 25·8 ins.	
Kafir Thorn	,, 71·4 ,,		
Karree	,, 93·6 ,,	thermometer 75° F.	

Thus, then, the analysis of the willow charcoal for the purpose in hand, should read:—

Total water	6·6
Volatile matter	4·38
Carbon	85·5
Ash	3·52
	100·00

And it now becomes evident why this charcoal is so efficient, in spite of its large relative volume. Taking the other extreme, we have for karree:

Total water	7·8
Volatile matter	22·2
Carbon	66·92
Ash	3·08
	100·00

This sample of karree charcoal yielded a small quantity of combustable gas, but not enough to affect the fact that it contains much less carbon than willow. Making due allowance for variations in different burnings, it may be taken that willow charcoal is 20 per cent. better than the others weight for weight, and so has only to be fed 10 per cent. faster into the producer to make up for its one-third greater volume. Water in charcoal to the extent found in above samples is not deleterious, notwithstanding that a lot of heat is lost by evaporating it, because the gas must be cooled down before it reaches the engine, and so long as enough steam can be generated by the heat left in the gas before it leaves the producer, there is no object in having the charcoal absolutely dry. Although all these charcoals are quite good for the purpose, yet there are additional advantages for willow in that it only requires half the labour to cut and prepare for charcoal making, and that it is one of the quickest growing trees and is easily propagated by cuttings. These considerations are important to farmers using suction gas along rivers where the willow flourishes.

Comparing anthracite with charcoal, several factors have to be considered, apart from the relative price of the two fuels at any given spot. The chief of these are:—(1) The percentage of ash in the anthracite. (2) Its clinker-forming properties. (3) The percentage of anthracite thrown away with the ash and clinker (4) Its corrosive effects on producer and engine. Although there can be no doubt that good anthracite is to be

had in South Africa, yet it is the writer's experience that that delivered to consumers in Griqualand West is very high in ash, the lowest of several assays being 17 per cent. This would not be so bad did it not prevent the combustion of all the carbon present, but it is found that in order to keep up the gas supply, the coal has to be raked out before it is perfectly consumed to the centre of each piece. All this will no doubt be improved by careful sorting and washing of the coal, and by slight modifications in the producers. Taking the present state of things, it is perfectly safe to say that where anthracite costs £3 per ton, there charcoal is worth £3 10s. at least for irrigation purposes, and more still in towns where power users are desirous of eliminating the evil odours that are unavoidable for the few minutes while blowing up for a start, but it may interest some to know that the smell while running can be got rid of by passing the exit scrubber water through a barrel of hardwood charcoal. Seeing the enormous amount of timber, within easy reach of the railways, that is not of value for other uses, it may safely be predicted that a considerable charcoal industry will spring up in the near future.

LAND IRRIGATION PROJECTS.

SERVICES OF GOVERNMENT ENGINEERS FOR SURVEY AND INVESTIGATION.

The Secretary for Public Works has issued a Government Notice, dated November 3rd, in which it is notified (in terms of Section 15 (*f*) of Act 32, of 1906), that engineering assistance may be obtained by farmers in the preparation of surveys or plans and estimates for Irrigation Works upon the subjoined terms and conditions.

Applicants must be *bona fide* farmers, and the owners of the land which it is proposed to bring under irrigation.

Government Notice No. 708 of 1907 is cancelled.

TERMS AND CONDITIONS.

I. Informal Advice without Field or Office Work.

1. Informal advice of a general character will be given free of charge by the Director of Irrigation or by Circle Engineers at their respective headquarters to applicants making inquiry by letter or in person, provided that such advice does not involve preparation of any drawings or special office work.

2. Similarly informal advice of a general character will be given free of charge by officers on tour, provided (*a*) that no surveys will be made nor any plans or drawings prepared; rough sketches may, however, be furnished to illustrate advice given; (*b*) that the officer affording such advice be not detained in connection with any individual case for a period exceeding 24 hours.

3. Applications for advice under the last preceding section (*i.e.*, for advice to be rendered on the site of any contemplated irrigation work by an officer on tour) may be made to any Civil Commissioner; to the Director of Irrigation in Cape Town; or, to the Circle Engineers at Robertson and Grahamstown. Such applications should be substantially on Form "A," subjoined, and will be dealt with with the least possible delay in the most convenient sequence of farms affected, according to relative geographical position; means of communication; and, similar considerations. Officers on tour will in all cases follow a route defined with reference to the general requirements of their duties, and each applicant under this section to whose application attention can be given during any particular tour will as far as possible be advised beforehand of the route to be pursued so far as it affects his individual application, and of the extent to which he will be required to provide transport for the advising officer under the guarantee embodied in Form "A."

II. Surveys and Professional Advice involving Detention, *not exceeding* Three Days.

4. In the event of any applicant on receipt of advice under the preceding section desiring that minor field operations arising out of such advice be at once undertaken, the advising officer, subject to the exigencies of other duty, will forthwith proceed to carry out such field operations on completion by the applicant of the guarantee contained in Form "B" subjoined; provided that the period involved does not exceed three days, including travelling time to the next succeeding point to which applicant may have undertaken to provide transport.

5. The officer carrying out preliminary field surveys under the preceding section will advise the applicant accordingly, and report the advice thus given to the Director of Irrigation, who, if necessary, will subsequently communicate further with the applicant.

6. The field works contemplated by the preceding sections are minor surveying operations, such as running a line of levels, setting out a furrow, or similar work which can be disposed of on the spot without involving subsequent office work.

III. Surveys and Professional Assistance involving Detentions *exceeding* Three Days.

7. Any applicant desiring professional assistance likely to occupy more than three days shall apply for advice on the subjoined Form "C." Any application made under the preceding sections which may be estimated to entail field work for a period exceeding three days may be similarly dealt with.

8. The completed form may be forwarded, as in Section 3, to any Civil Commissioner, to the Director of Irrigation in Cape Town, or to the Circle Engineers at Robertson and Grahamstown, and the applicant will thereafter be advised of the amount which he will be required to deposit in respect of the professional assistance desired. In arriving at the amount of this deposit, allowance will be made for the cost of any office work entailed in addition to the field work. If possible, an estimate will also be given of the probable cost entailed in contingent services which may be required, such as transport for the officer engaged in field work; labour; materials; or, the like.

9. If thereafter the applicant shall desire that the services of a Government officer be made available, upon receipt of the deposit, arrangements will be made for completion of the investigation with all due despatch, an intimation being given to the applicant of the approximate date upon which work can be taken in hand.

10. In addition to the deposit provided for in Section 8, applicants will be required to provide suitable means of transport for the officer concerned during the period devoted to work in the field; to supply any unskilled labour that may be required; and to provide for any other contingent services; failing this the applicant will be required to pay the Government the cost of any outlay incurred upon transport, labour or other contingent services.

IV. Advice on Projects not *prima facie* involving Surveys or other Field Work.

11. Any applicant desiring professional advice which *prima facie* may not involve field work or a special visit to the site of proposed operations may, as provided for in Section 1 above, address inquiries to the

Director of Irrigation or to Circle Engineers in any convenient form. Should such inquiry, however, involve special office work or the preparation of drawings, the applicant will be furnished with an estimate of the amount to be deposited in respect to the service desired. On acceptance of this estimate, the necessary steps will be taken, subject to the exigencies of the Department and to the special approval of the Minister.

V. Detailed Advice in projects involving Surveys and other Field Work.

12. Should any applicant after investigation of a project under any preceding section desire to be furnished with more complete detailed information, a lump sum estimate of the total cost likely to be entailed by the necessary field and office operations will be furnished, and upon acceptance of this estimate by the applicant and subject to the approval of the Minister and to the exigencies of the Department the work will be undertaken with the least possible delay.

VI. Applications for Irrigation Loans under £500: Information to be supplied by Applicant.

13. Under Section 102 of Act 32 of 1906, loans under *£500* may be granted without submission of detailed plans and specifications, but with a view to enabling the feasibility and probable efficiency of the proposed works to receive due consideration, the particulars set forth in Form "D," subjoined, must accompany the original Application for a Loan.

VII. General.

14. The foregoing regulations will apply *to all applications* for professional assistance in respect to land irrigation proposals irrespective of whether it is intended that the works should subsequently become the subject of an application for a Government Loan under Part VII. of Act 32 of 1906, or whether they are proposed to be executed with funds derived from other sources. If preferred, applicants may engage the services of Engineers in private practice for the investigation of any project, and if schemes so prepared are at the outset submitted in a satisfactory form, no charge will be made for any advice given in respect to any alterations or developments. In the event, however, of any special expenditure from public funds being found necessary owing to unsatisfactory or defective original preparation of any scheme, the applicant will be required before any local investigation is undertaken to guarantee payment of such sum as may be fixed in consideration of the circumstances of each case.

15. These regulations are subject to such alterations or amendments as may from time to time be notified, and no liability shall attach to the Government in respect to matters arising hereunder.

FORM "A."

LAND IRRIGATION PROJECTS.

APPLICATION UNDER SECTION 3, PART I., OF GOVERNMENT NOTICE No. 1248 OF 1908.

Date ....

To the ....

Application is hereby made for professional advice in respect to the initiation of an irrigation project under Section 3 of Government Notice No. 1248 of 1908, with the terms of which I have fully acquainted myself and by which I hereby agree to be fully bound in all respects.

I guarantee and undertake when called upon to provide suitable transport between such points as may be indicated to me for any officer deputed to visit my farm in pursuance of this application, and failing such provision on my part to pay the actual cost incurred in transport between such points.

Signature of applicant ....

Division ....

Field-cornetcy ....

Name of Farm ....

FORM "B."

LAND IRRIGATION PROJECTS.

APPLICATION UNDER SECTION 4, PART II., OF REGULATIONS UNDER GOVERNMENT NOTICE No. 1248 OF 1908.

I hereby guarantee and undertake to pay to the Civil Commissioner of.......... ....the sum of £ ...., being payment at the rate of £1 per day for .... days in respect of field work to be performed at my request by .... in connection with a proposed land irrigation scheme on my farm .... in the Division of ....

I further guarantee to provide during operations in the field for the supply of any unskilled labour, materials or other contingent services required, to the satisfaction of the said officer, or failing such supply by me to pay the actual cost incurred upon such services.

Signature of applicant ....

Date ....

Witnesses :—

1...

2...

FORM "C."

LAND IRRIGATION PROJECTS.

APPLICATION FOR SURVEY AND INVESTIGATION UNDER SECTION 7, PART III., OF GOVERNMENT NOTICE No. 1248 OF 1908.

Address...
Date... ...

To the (1) Civil Commissioner . . .
or (2) The Director of Irrigation, Cape Town.
or (3) The Circle Engineer, Grahamstown.
Robertson.

Application is hereby made for the services of a Government Engineer for the survey and investigation of the land irrigation project described below, under the terms and conditions stated in Government Notice No. 1248 of 1908, with all of which I have fully acquainted myself, and by which I hereby agree to be fully bound in all respects.

(Signature of Applicant.)

General description of Project.

1. *Division* . . . .
2. *Field cornetcy* . . . .
3. *Details regarding farms and area to be irrigated:—*

Names or Numbers of Farms.
Names of Owners.
Area to be irrigated in each Farm.

4. *Chief classes of crops* to be irrigated and time of year during which water will be required for each crop:—
5. *Source from which water is to be obtained*, whether from:—

(*a*) Storage . . . .
(*b*) Stream or River . . . .
(*c*) Fountain, well or borehole, etc. . . . . .

6. *Nature of works proposed.* State as full particulars as possible regarding the site, nature and dimensions of each proposed work: the probable position, length, and height of each weir or dam: the nature of the rock or soil upon which it will be founded: the material available for construction: the probable length of each furrow, etc.

FORM "D."

LAND IRRIGATION PROJECTS.

APPLICATION FOR LOAN NOT EXCEEDING £500 UNDER SECTION 13, PART VI., OF GOVERNMENT NOTICE No. 1248 OF 1908.

Signature of applicant ....
Address ....
Date ....

General description of Project.

1. *Division* ....
2. *Field-cornetcy* ....
3. *Details regarding farms and area to be irrigated:*—

(*a*) Names or Numbers of Farms.
(*b*) Names of Owners.
(*c*) Area to be irrigated in each Farm.

4. *Chief classes of crops* to be irrigated and time of year during which water will be required for each crop :—

5. *Source from which water is to be obtained*, whether from :—

(*a*) Storage ....
(*b*) Stream or River ....
(*c*) Fountain, well or borehole, etc. ....

6. *Nature of works proposed.* State as full particulars as possible regarding the site, nature and dimensions of each proposed work:

The probable position, length, and height of each weir or dam;
The nature of the rock or soil upon which it will be founded:
The material available for construction;
The probable length of each furrow, etc.

7. *Cost, Data and Estimates.* (*a*) Rates of wages ruling locally: (*b*) Plant to be employed in construction: (*c*) Estimated cost per unit laid down at the work of any materials not locally produced but which it is proposed to use, such as cement, iron or other piping, fluming or similar material: (*d*) Quotations received for any pumping machinery, windmills, or the like, should the employment of such be contemplated.

SULPHUR AS A PEST REMEDY.

By Dr. C. F. Juritz, Senior Government Analyst.

Enquiries have frequently been made with regard to the class of sulphur suitable for combatting oïdium on vines, scab on sheep, and scale in orchards. It has been the endeavour of the laboratory staff as far as possible to meet the difficulties, and to reply to the questions thus placed before them in individual correspondence; but new problems are continually arising, and of late there has been such an increasing amount of enquiry in relation to the whole subject that it has been thought desirable to deal with the matter in a rather more comprehensive manner than hitherto.

Of the three applications of sulphur above mentioned, its employment against oïdium, or, as it is occasionally termed, powdery mildew of the vine, is that which is generally regarded as the most exacting in its demands upon the purity and general excellence of quality of the sulphur. It has been a widely accepted belief that while for vine-sulphuring none but the very best sulphur can be used, it does not matter in the slightest what class of article is employed for sheep-dipping, and for fruit trees a half-way-house kind of sulphur is well adapted. Experience proved that these opinions were not in every respect well founded, and so of late the pendulum has swung to an opposite extreme, and the view is now put forward that, in order to participate in the composition of an effective sheep dip, sulphur must possess all the qualities which have been considered essential to render it suitable as a fungicide against oïdium. That these views have been prevalent is shown by the questions which have been put by merchants and farmers at various times during the last fifteen years. It is well, therefore, that we examine the subject at some detail.

Flour Sulphur and Flowers of Sulphur.

By way of preface, a few not unimportant points may be referred to in connection with the forms in which sulphur is met with in commerce. In its crude form, sulphur is found mixed with limestone, gypsum, etc., in the volcanic districts of Sicily. It is there separated from the ore by fusion, when the sulphur melts out, forming the article commonly called crude *brimstone*. Crude Sicilian sulphur, the raw product obtained by the fusion process at the mines, usually contains from 4 to 12 per cent. of impurities. There are over 600 mines at work, and these produce on the spot the raw article as exported from Sicily. There could scarcely be a cheaper form of sulphur, and, although capable of many employments, brimstone as imported into England cannot be used for *all* purposes—for making gunpowder, for instance—and hence it is often refined from its earthy impurities by distillation or sublimation. The vapour which arises from the heated sulphur passes over into a cold condensing chamber, where the sudden cooling causes the sulphur to deposit, like a yellow snow, in a very fine state of division.

This very finely divided sulphur is scraped out and appears upon the market as *flowers of sulphur.* When the sublimation has been going on for some days, the condensing chamber becomes so warm that the sulphur no longer condenses to the solid state as flowers, but collects at the bottom of the chamber as a liquid: this liquid sulphur is drawn into cylindrical moulds, where it solidifies into the *roll sulphur* of commerce. Roll sulphur is frequently crushed and ground, and is then sold as *flour sulphur.*

During the sublimation the impurities remain behind, and the sulphur that passes over into the condensing chamber is almost absolutely pure. It follows, therefore, from what has been said above, that as far as purity goes, flowers of sulphur and flour sulphur are equally good, but it is not always practicable to grind the roll sulphur quite as finely as the sudden cooling of its vapour may cause the flowers of sulphur to be.

As a means of distinguishing between flowers of sulphur and the finest grades of flour sulphur, it may be said that flowers invariably possess the distinct yellow colour which is so well known as associated with sulphur: flour sulphur, when only coarsely ground, exhibits the same yellow colour, but, the more finely it is crushed, the lighter in colour it becomes. Whiteness, therefore, does not necessarily indicate impurity, but simply a very finely ground roll sulphur.

It is worth remembering that fine sulphur occupies much more space than coarse sulphur. If a certain quantity of coarsely ground sulphur just fills one bag, it is quite likely that fine flowers of sulphur may nearly, if not entirely, fill two bags of the same size. Hence it follows that the bigger the bag needed to contain a given weight of sulphur, the finer will be the sulphur. This is evidenced in the appended illustration, Fig. 1, which shows the comparative volume occupied by four sulphurs recently examined in the Government Laboratory. Equal weights of sulphur were taken, and the quantity contained in each tube weighed exactly five grammes.

Another class of sulphur that has recently been put on the market is the so-called *crystalline sulphur.* It is obtained by pumping large quantities of melted sulphur into bins, and allowing the liquid to solidify by cooling. It is then broken up into lumps by means of pickaxes, and sold in that condition.

Having said this much with regard to the principal forms of sulphur in extensive commercial use, we may pass on to brief consideration of sulphur in its three chief applications as a fungicide and insecticide.

Sulphuring of Vines.

We take the treatment of oïdium to begin with. Close on sixty years have passed since the dusting of powdered sulphur over the affected vines was first introduced in France as a remedy against this pest. The action of the sulphur is considered to lie in the destructive effect on the mycelium and spores of the fumes which it gives off when the weather is warm enough. The fumes do not appear to come off unless the air-temperature is above 75° F. In proportion as the weather is warmer their action increases, and at 100° F. their evolution and destroying effect on the fungus proceeds most energetically. Above 110° F. the sulphur injures not only the fungus but the vine itself. It is not positively known whether these fumes are simply sulphur vapour or whether the activity consists also in the presence of sulphurous oxide or of sulphuretted hydrogen.

As to the application of the sulphur to the vines, it has been found that when the leaves are wet the tendency of the sulphur is to collect into patches, and so to exert its action only on those parts with which it is in immediate contact, leaving other parts unacted upon. A somewhat similar feature, under other conditions, will be alluded to at a later stage.

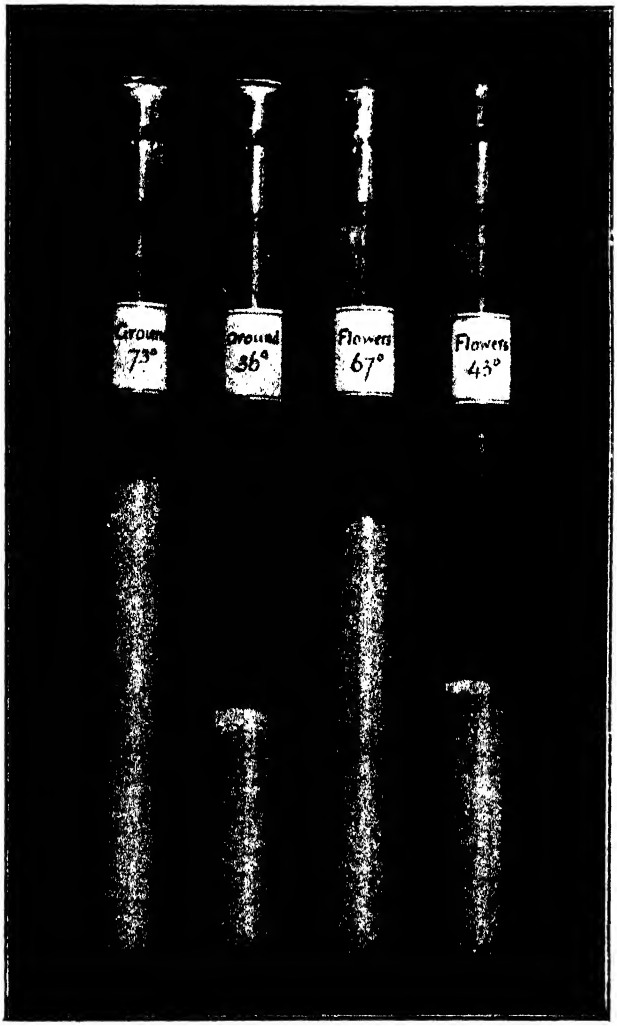


Fig. 1.—Comparative volume of fine and coarse Sulphurs.

It may be presumed that if its remedial effects result from the fumes which it evolves in warm weather, it may suffice to scatter the sulphur on the ground below the vines. Experience has shown that this presumption is not borne out in practice unless the weather is so warm that sulphur placed directly on the vines causes a burning of the leaves. It follows therefore that to exert its proper effect the sulphur must be in actual contact with all the diseased parts of the vine.

C

Fineness.

In order that the contact just referred to may be thorough and continuous, it is very obvious that the sulphur must be in the condition of an exceedingly fine powder. And this is necessary also for another very important reason: the finer the particles of sulphur, the more surface there will be exposed to the oxidising influence of the air, and hence the more fumes will be produced, so that, other things being equal, the more effective will be the action sought to be produced; the more perfect, too, will be the distribution of which the sulphur is capable, and the closer will it adhere to the vines.

To test the degree of fineness, as it is called, of any particular sample of sulphur, an apparatus called Chancel's Sulforimeter is usually employed. The method of applying this test is fairly simple. The sulforimeter is a tube of even bore, of about 12 to 15 mm. diameter.* This tube is graduated in degrees from zero to 100, and when filled to the 100 line holds exactly 25 cc. at 17·5° C. It is at this latter temperature that the tests should be made, for an increase of 2° C. raises the fineness 1° Chancel. The sulphur to be tested is first sifted through a sieve with a mesh of 1 sq. mm., and is then spread out on a sheet of paper. Five grammes, collected from various portions of the sample, are weighed out and placed in the tube: into the latter absolute ether, free from water, is now poured up to the 50° mark, and the sulforimeter is energetically shaken until the contained sulphur is free from lumps. More ether is then added to about four or five degrees *above* the 100° mark, and the mixture is again shaken energetically. The tube is very gently placed at rest in a perfectly upright position, and when the sulphur particles have all settled the reading of the upper surface of the sulphur is taken. As the result of the first reading is usually too high, the shaking process is to be repeated four or five times, and the reading taken on each occasion. There may be a variation of about 2° Chancel in different tests.

It has been commonly held that, in order to be effective against oïdium, the fineness of sulphur should not fall below 60° Chancel when tested as above described, 67° being taken as a normal standard. The scale of degrees is, of course, purely arbitrary, and sulphur of the requisite degree of fineness is not always easily procurable, and used to vary considerably from year to year. According to *Die Weinlaube*, a German paper devoted to the culture of the vine, the finest sulphur examined during 1879 registered 82° Chancel, but in 1880 no finer sulphur than 72° was procurable, and by 1881 the maximum fineness had dropped to 60°. About fifteen years ago sulphurs much above 50° in fineness were not easily procurable in Cape Town, and the specimens then purchased for testing purposes varied between 47° and 53°.

Purity.

It may possibly have been due to the comparative coarseness of the article then in use that the practical results in the vineyards were of a nature to give rise to numerous complaints, but at all events it was asserted at fruit growers' conferences that the quality of sulphur on the market was such as to make it practically worthless, and the idea soon found wide currency that the sulphur imported into the Colony was impure, and contained admixtures of inert matter. There has never been any foundation whatever for such an opinion. The sulphurs examined in

* The appearance of the sulforimeter is shown in the illustration already referred to: see Fig. 1.

the Government Laboratory have always averaged great purity, and it may have been their comparative coarseness that originated the inefficiency complained of at the time. It may, however, be of interest to record some actual figures regarding the purity of sulphurs examined in the laboratory, and for that purpose the samples thus analysed during the last ten or eleven years are taken: they are not very numerous, for the reason that the purity of the imported sulphur ceased to be questioned as soon as assurance could be given that the surmised adulteration of the article had no basis in fact. The following table gives the figures in regard to the sulphurs tested for purity during the years mentioned, and they include ground sulphur as well as flowers of sulphur:—

Year.	No. of samples tested for purity.	Percentage of pure sulphur found. Minimum.	Maximum.	Average.
1897	1	—	—	99·07
1898	3	99·73	99·81	99·78
1899	Nil.	—	—	—
1900	5	98·49	99·87	99·25
1901–4	Nil.	—	—	—
1905	4	98·89	99·80	99·44
1906	6	98·52	99·82	99·32
1907	1	—	—	98·29
1908	9	93·25	99·84	98·50
Summary ...	29	93·25	99·84	99·07

Only in two cases did the percentage of pure sulphur in a sample fall below 98; both of these were examined during the current year: in one, the sulphur which showed 93·25 per cent., the explanation given was that five per cent. of a foreign ingredient had been added, when preparing the sulphur for market, in order to prevent the rolling or balling together of the sulphur particles, and with the special object of maintaining throughout a very fine state of division.* The other sample of apparently low purity contained 97·28 per cent. of sulphur, but this was due to the fact of the article being more moist than is usually the case: it contained as much as 2·37 per cent. of moisture.

Dampness of Sulphur.

The point raised in connection with the two samples just alluded to opens up a phase of the subject which needs more than a mere passing word. In 1894, when sulphurs were being tested in this laboratory for vineyard use, the only quality other than fineness that had been generally looked upon as essential was general purity, that is to say, freedom from inactive substances. During that year, however, experiments were made from which it was concluded that, advantageous as it was to employ sulphur of a high degree of fineness, the advantage became counterbalanced if the quality of fineness were insisted on too exclusively, and compensating disadvantages then became liable to appear. To illustrate: Ten samples of sulphur were examined in the Government laboratory, of which four exceeded 60° Chancel in fineness, one being as high as

* Analysis showed this article to contain 5·08 per cent. of solid matter other than sulphur, and 1·67 per cent. of moisture. The "balling" qualities are thus accounted for. Allusion is made to this balling or clogging further on in this paper.

69·1° Chancel. If fineness were the only quality, besides purity, essential for efficacy in vine sulphuring, it could have been expected that good results would follow the use of those four sulphurs; certainly better results than one could hope to attain with the coarser sulphurs. Such expectations were, nevertheless, not borne out in practice. Practical experiments were instituted in the Government vineyards at Groot Constantia: a sulphur of 57·3° fineness was tested against two others of respectively 64° and 65°, the same brand being, in each case, used on the same plot of vines right through the season, and the applications being made simultaneously on all the plots. The finer brands showed no superiority over the coarser one, and the conclusion arrived at by the late Mr. J. P. de Waal, at that time officer in charge of Groot Constantia, was that "excepting the use of a too coarse sulphur, the effect of sulphuring against oïdium depends certainly more on the mode of application and the conditions of the weather during and after the operation than on the fineness of the article. Given a series of calm sunny days, a sulphur of 55·6° of fineness will have an excellent effect, whereas the finest and best of sulphurs will have hardly any effect in damp, windy, and rainy weather." Mr. De Waal had been moved to this conclusion partly because of the fact that the two sulphurs of 64 and 65 degrees fineness were found to possess a "clogginess" which rendered their uniform application difficult, while the coarser sulphur was always powdery and could be applied as a fine cloud.

The addition of some lime proved to be a means of overcoming the "clogginess," but this, of course, at once made the sulphur less pure, and at the same time direct loss resulted because it was found that more or less of a lumpy mass of lime and sulphur, incapable of dissemination, was formed.

This brought experiment back from the vineyard to the laboratory. Sieve tests were applied, and it was found that, while the coarser sulphur (57·3°) readily passed entirely through a sieve of 40 meshes per linear inch, the other two (64° and 65°) left on the sieve a residue of from 20 to 25 per cent. It seemed strange that the finer sulphurs should not pass through a sieve that allowed the coarser one to pass through freely, and so a microscopic examination of the three sulphurs was made, and the whole mystery became clear. In the coarser sulphurs each individual particle was distinct and detached from the others, whereas the particles of the finer sulphurs were joined to each other in strings or in irregular groups, with the nett result that the sulphur particles thus cohering together, became virtually coarser than even the 57·3 sulphur. When the sulphur is shaken up with ether in the sulforimeter, this fact would not be observable. In order to find out what the cause of this cohesion was, a little investigation was made, and showed that while the sulphur which passed readily through the sieve contained only ·11 per cent. of moisture, the finer sulphurs contained respectively ·43 and ·57 per cent. of moisture. It was, therefore, evidently the larger proportion of moisture that caused that coherence of particles in the finer sulphurs, resulting in the clogginess, apparent dampness, and consequent uneven distribution, frim which defects the coarser sulphur was entirely free.

Presence of Free Sulphuric Acid.

Further investigations were then made in the laboratory in order to ascertain what the dampness itself was caused by, and it was found in the case of some brands that a noticeable—although very minute—quantity of sulphuric acid had remained in the prepared sulphur. This sulphuric acid had clearly been formed during the preparation of the flowers

of sulphur by sublimation.* The sulphur upon which this investigation was first conducted was of the highest class as regards what had always been considered the essentials of an excellent article for vine-sulphuring: it was very pure (containing 99·62 per cent. of pure sulphur); it was, moreover, of an exceptionally high degree of fineness (72·7° Chancel); but it contained ·3 per cent. of moisture. Under those circumstances it was not surprising that it was rather clotty, and failed to pass readily through a fine sieve. The clottiness was apparently due to the dampness, very slight although that dampness was, and this in turn was due to the trace of sulphuric acid which the sulphur contained, for sulphuric acid is very hygroscopic, that is to say, it possesses the property of attracting and absorbing moisture from the air. The clots could very easily be pulverised by slight pressure of the fingers, but their existence seemed quite sufficient to impair the distributive qualities of the sulphur, and hence to constitute a practical objection to its use on the part of farmers.

It appears that in sulphurs having a fineness above 77° Chancel, free sulphuric acid is usually present in greater or less degree owing to the oxidation of the too finely divided sulphur particles. From this it follows even more clearly that too high a degree of fineness may bring compensating disadvantages.

Summary.

To sum up the salient points from the foregoing remarks: Sulphur, whether ground or flowers, if it is to be effectual for destroying oïdium, should possess certain physical and chemical properties. Of these the most important are:—

I. Physical.—(1) Fineness. (2) Uniformity of fineness. (3) Absence of clogging tendency.

II. Chemical.—(1) Purity. (2) Freedom from moisture. (3) Freedom from hygroscopic substances.

The tendency to clog may be caused by chemical defects (such as the presence of an undue amount of moisture, or of other impurities); it may also result from the physical nature of the sulphur particles, whether globular, elongated, etc.

The few facts stated demonstrate that chemical purity alone is not a sufficient gauge of the suitability of sulphur for viticultural purposes, and as for the other chemical properties, they directly affect the physical qualities of the sulphur, so that the laboratory test of the capacity of a sulphur for destroying oïdium becomes resolved into a determination of its physical condition. The apparatus called Chancel's sulforimeter has been devised for the purpose of testing this physical condition, as far as it can be expressed in degrees, by the relative segregation of the particles when suspended in ether. A good sulphur, according to European authorities, should have a fineness of at least 60°. Several samples, however, varying in fineness from 62° to 73°, when tested in the Government laboratories, have been found to possess greater disadvantages than coarser sulphurs, which averaged from 54° to 58°, but were more uniform in grade. Such fairly coarse sulphurs, say of 57° Chancel, may be considered as excellently suited for viticultural purposes in this Colony, whose warm and sunny climate permits of a coarser sulphur being advantageously employed than can be effectively made use of in colder countries.

In brief then a reliable sulphur must be: (*a*) Practically free from foreign substances; (*b*) of fineness above say 55° Chancel; (*c*) capable of free passage through a sieve of 40 meshes per linear inch.

---

* To free entirely the sublimed flowers of sulphur from this sulphuric acid is almost impractible, but the quantity should not be so large as to cause the difficulties alluded to.

Comparative Adaptability for Vines.

As already remarked, roll sulphur and flowers of sulphur are equally pure, hence, where chemical purity is the only requisite, the one can be used as well as the other. But in none of the cases that we have been considering is chemical purity the only requisite. We have seen that when fighting the oïdium, other important points are to be considered. One of these is fineness. Roll sulphur is often very finely ground, and is then sold as flour sulphur or triturated sulphur, but, unless a great deal of additional and needless expense be entered upon, it is seldom possible to grind roll sulphur to the fineness of the higher grades of flowers of sulphur. Of course, when roll sulphur is ground as finely as it is possible to grind it, there will be in the ground material a vast amount of particles quite fine enough to be of effective service against the oïdium, but there will also be very much that is not sufficiently fine, all of which latter must be regarded as so much waste. Now, if waste of sulphur were a very serious item, this would be a real consideration, but it may well be asked whether such is the case. It may reasonably be questioned whether more sulphur is not wasted by an improper method of applying fine flowers of sulphur than by scientifically applying a ground sulphur, which is—much of it, perhaps—so coarse that only a fractional part thereof is of real benefit. There is, for instance, the method of throwing on the sulphur by hand; this, it is said, causes, on an average, a waste of 90 per cent. of the sulphur used. The method of sifting the sulphur on to the vines from perforated cans is possibly somewhat better, but this too causes much waste. It would seem to follow clearly that a cheaper ground sulphur can as well be used under circumstances of such prodigality as a more expensive article, and even the question of absolute purity becomes less important, because, with a liberal application, there will always be sufficient fine sulphur to do the work. This is the view that has of late been taken at the University Agricultural Experiment Station, Berkeley, California, U.S.A., and has been so expressed by Mr. F. T. Bioletti, in Bulletin No. 186 of that Station, on "Oïdium, or Powdery Mildew of the Vine."

"Any kind of sulphur in the condition of a powder," says Mr. Bioletti, in the publication just mentioned, "will control the disease if used as directed. Coarse powders, however, must be used in much greater quantities, and are more difficult to apply properly. The absolute purity of the sulphur is of little importance, provided there is no large adulteration with inert and useless substances such as gypsum." He goes on to quote examples of sulphurs that had recently been examined at the station: both sublimed and ground sulphur are included. As to purity, as in our Colony, there was nothing better to be desired, but in the important matter of fineness there were wide differences. The flowers of sulphur ranged from 40·0 to 66·8 degrees Chancel, the ground sulphurs from 34·0 to 61·6 degrees. One of the cheapest, a ground sulphur of 51·6 degrees fineness, with very little coarse material, was considered of excellent quality for vine sulphuring; one of the worst for the purpose—its fineness was 34·0—was also one of the most expensive amongst the ground sulphurs, and consisted, when examined by the microscope, principally of large particles. Commercial flowers of sulphur of finest quality have been found to possess a fineness of from 75 to 90, but many good samples of that class have shown between 50 and 70 degrees. The fineness of ordinary ground sulphur is about 43 degrees, the best ground sulphurs ranging from 60 to 70 and over.* Of thirty sulphurs examined

* As the illustrations herewith show, ground sulphurs of about 70 degrees fineness have been examined in the Government Analytical Laboratory at Cape Town, and if ground roll sulphur of this fineness can be put on the market at one half the cost of the finest flowers of sulphur the probability is that any waste involved in its application will be compensated for by the comparative cheapness of the article.

at the station, all except two were considered to contain sufficient fine material to do effective work, the two exceptions being ground sulphurs of 34·0 and 34·4 degrees fineness respectively. The rest of the samples ranged from 36·0 (a ground sulphur) to 66·8 (a sublimed sulphur). If application were made by hand or with perforated cans, any of these would perhaps be equally good—other than the two specially excepted—and under such circumstances it would be most advisable to use the cheapest, for when, in any case, much sulphur is wasted owing to wasteful manner of application, it does not matter whether 25 per cent. or 50 per cent. of the sulphur is useless.

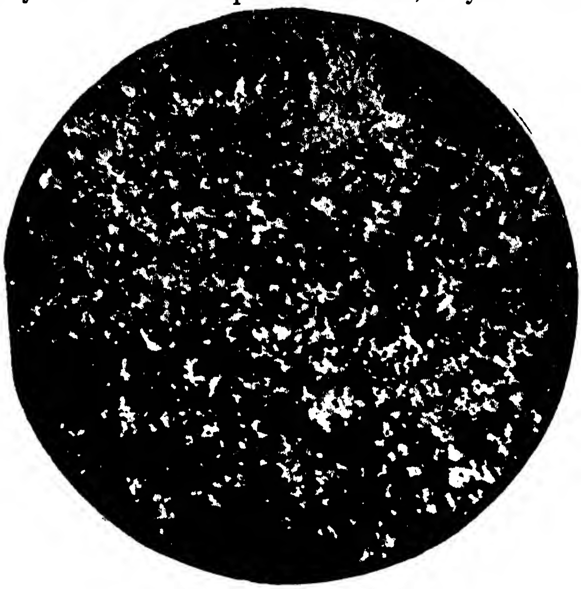


Fig. 2.—Ground Sulphur, 73°.

At the same time these remarks must not be taken to imply that the coarser sulphurs can always be made to do equally well with the finest: such, it must be repeated, is the case only where the mode of applying the sulphur is defective. With good sulphur distributing machines the superiority of the finer grades distinctly tells, and—more especially where economy in sulphur is desired—it would assuredly be desirable to take advantage hereof by adopting these higher grades.

Fig. 3.—Ground Sulphur, 36°.

Four micro-photographs are attached for the purpose of illustrating some of the sulphurs recently examined in the Government Analytical Laboratory at Cape Town. The samples from which these photographs were taken were the identical sulphurs already illustrated in connection with the subject of comparative volume and the Chancel test. The uniform character of the finer ground sulphur (73°), as revealed by the microscope, is distinctly seen in Fig. 2, and compares most favourably

with the article of 43° fineness which was locally purchased as flowers of sulphur (Fig. 5), and in which many large angular fragments are easily discernible. Of these two particular specimens, the ground sulphur is unquestionably to be preferred in all respects.

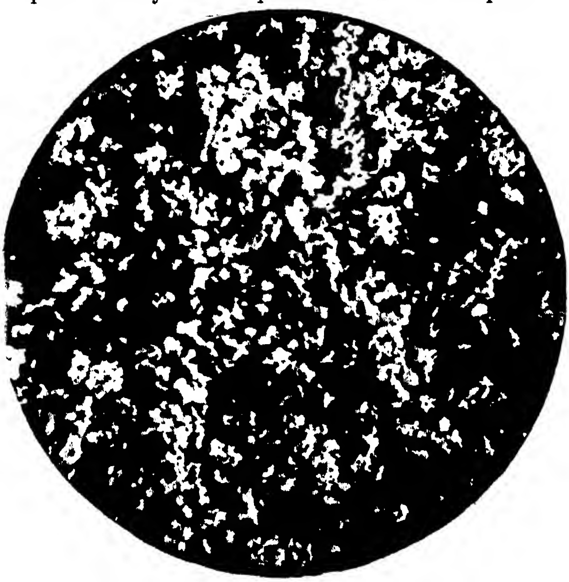


Fig.4—.Flowers of Sulphur, 67°.

Fig. 4 exemplifies not only the rounded character of the finer flowers of sulphur particles whereof thev way of forming little strings or chains, while a glance at both the coarser specimens illustrated (Figs. 3 and 5) will make it easier to understand how the much more massive nature of the particles wherof they are composed hinders the free access of air to all parts of the sulphur, and thus prevents the ready production of the sulphur fumes so easily formed when the finer sulphurs, whether ground or flowers, are used.

Use of Sulphur in Orchards.

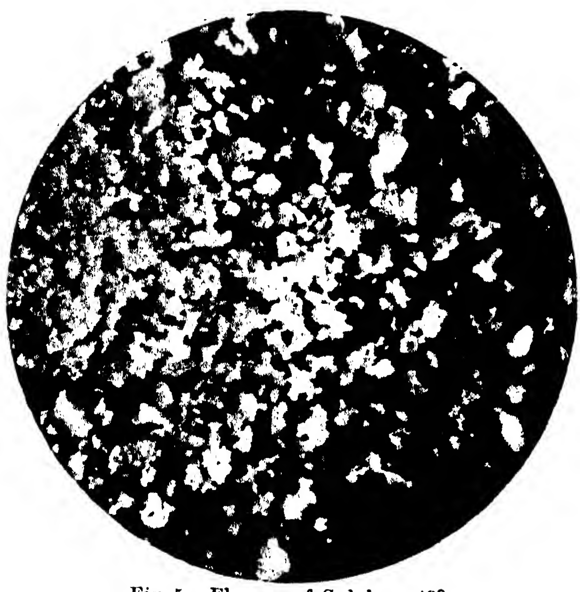


Fig. 5.-- Flowers of Sulphur, 43°.

From time to time various experiments have been made in the Government laboratories in connection with the use of sulphur in the preparation of lime-sulphur-salt-soda washes as what have como to be called "scalecides." Lime - sulphur - salt washes compounded according to one recipe or another, have been used for several years in California as the standard remedy for San Jose scale. The use of such a mixture on fruit trees is of comparatively recent date, having developed out of its employment against scab in sheep no further back than 1886.* It was actually

* The Government Entomologist informs me that he understands lime and sulphur sheep dips to have been used for scale in this Colony prior to the date mentioned.

a lime-sulphur sheep dip that was first put to this use, but the formula has since then undergone many modifications, and for the purpose mentioned its adoption against scale-pests is now quite recognised as a distinct function apart from its employment against scab.

In the preparation of the wash, lime and sulphur are boiled in water, with or without salt, until the chemical action between the lime and the sulphur has caused the latter, either wholly, or in great part, to dissolve, producing a solution possessing the well-known insecticidal qualities. Sulphur here constitutes the chief essential, for by entering into chemical combination it forms compounds which are the active agents in destroying the scale, and the effect of the wash as an insecticide depends, therefore, very largely upon the proportion of sulphur employed in making up the mixture.

Class of Sulphur for Scale Washes.

It is obvious that the subject of fineness, so very essential in connection with the use of *dry* sulphur against oïdium, occupies a far less important position in regard to *liquid* washes. Wholly unimportant it certainly is not, for the hard big lumps of crystalline sulphur, or indeed of any sulphur that is in no sense a *powder*, cannot be of much use in making these washes, as even after prolonged boiling much free sulphur remains undissolved and is wasted in consequence. At the same time a powdery condition is as much as is requisite. Hence it is also obvious, that, since the only difference between ground roll sulphur (flour sulphur) and flowers of sulphur is that of fineness, directly the latter ceases to be essential the one article can be used as well as the other.

To a limited extent ground brimstone (*i.e.*, native sulphur fused out from the ore, but unrefined) has been used in making scale washes, but its suitability for this purpose has not yet been sufficiently investigated, and would depend upon its purity, but if ground to powder or sifted and comparatively free from impurities, there seems to be no reason why it should not do as well as flour sulphur for the purpose, especially as its comparative cheapness would lessen the cost of the scale wash.

The United States Department of Agriculture has compared the composition of scale washes made with flowers of sulphur and that of washes wherein flour sulphur has been used:* the conclusion come to was that no essential difference exists, practically all the sulphur, in each case, being dissolved by one hour's boiling, but that 45 minutes generally sufficed. In "crystalline" sulphur, however, the amount left undissolved varied greatly, and naturally depended upon the size of the lumps of sulphur, but the waste was so great as to render the use of this form undesirable. Even when finely ground at least 1½ hour and preferably 2 hours were necessary to dissolve most of the sulphur.

Lime and Sulphur Sheep Dips.

As already stated, the lime-sulphur scale wash is merely a development of the lime-sulphur sheep dip, and from adaptability for the one adaptability for the other naturally follows. As with the one, so with the other, the importance of fineness is much restricted, and, therefore, too, ground roll sulphur can be used with quite as good results as flowers of sulphur. In both cases it would be unwise to waste on the production of a lime-sulphur dip, sulphur which has been rendered comparatively expensive by the devotion of special attention to rendering it an article of extreme fineness. A cheaper, coarser (within limits) and less refined (again within limits) article will answer all the purpose of the finer and more costly article.

* U.S.A. Dept. of Ag. Year Book, 1906, p. 438.

On the other hand, the free sulphuric acid usually present in the very fine sulphurs—*i.e.* of 77° Chancel and over—is no bar to the use of the article for sheep dipping as it is in vine sulphuring.

It is not only, nor is it chiefly, or even largely, the sulphur as such that is the effective agent in these dips when prepared for use: it is the compound, or series of compounds, formed between the lime and the sulphur and dissolved in the liquid whereon the activity of the dip depends. A good sulphur coupled with an efficient lime will give an imperfect dip, and it would therefore be illogical immediately to ascribe such imperfection to the sulphur. It is the lime that brings the sulphur into solution, and usually it may be said that the more lime there is in solution the more sulphur will dissolve.

Amongst the many lime and sulphur dips analysed in the Government laboratories from time to time, the strongest ever examined possessed a specific gravity of 1·308 and contained 17·19 per cent.* of lime and 35·29 of sulphur. The average quantities contained have been about 9 to 12 per cent. of lime and 18 to 22 per cent. of sulphur, in a liquid possessing a specific gravity somewhere about 1·022.

Soda is now frequently substituted for lime in sheep dip as means of bringing sulphur into solution. The first occasion of such a soda-sulphur dip being submitted to the Government laboratories for analysis was in 1899: the opinion was then expressed that the mixture would probably prove effective in the destruction of the acarus, but that the possibility of deleterious effect on the wool or the sheep remained to be ascertained. Since then, however, this article has come into general use, and the possibility hinted at does not seem to have been experienced in actual working.

Unboiled Lime-Sulphur Dips.

Fifteen years ago some experiments were conducted in the laboratory to test the efficiency of the practice at that time in vogue amongst certain of the Eastern Province farmers of mixing the ingredients of the dip into a paste with cold wat r, leaving them to interact on each other for four days. Whatever may happen where quicklime is employed, it was abundantly clear that the use of slaked lime under these circumstances involved a great waste of sulphur, and was therefore uneconomical. Of late years the Bureau of Chemistry of the United States has experimented with unboiled lime-sulphur dips. When caustic soda is added to the mixture, and hot water used, the waste of sulphur is greatly reduced, but then it is the soda rather than the lime that effects solution of the sulphur, and even then much of the latter remains undissolved.

The heat generated by quicklime alone in slaking was evidently quite insufficient to attain to the desired result, and even the addition of a large excess of lime failed to effect satisfactory solution of the sulphur.

[* The expression per cent. is here for convenience used as indicating grammes per 100 cubic centimetres.]

THE POTTEBERG FARMS IN THE HEIDELBERG DISTRICT.

MR. ANDERS OHLSSON'S GREAT ENTERPRISE.

(Contributed by Chas. Marais.)

Being under the impression that practically little or nothing is known of the extensive farming operations carried on in these parts by Mr. Anders Ohlsson, of Cape Town, and thinking that your readers may be interested in the work which is being carried out, I will endeavour to give you a brief outline of what is being done, and at the same time I am enclosing a few photographs, which you may care to publish.

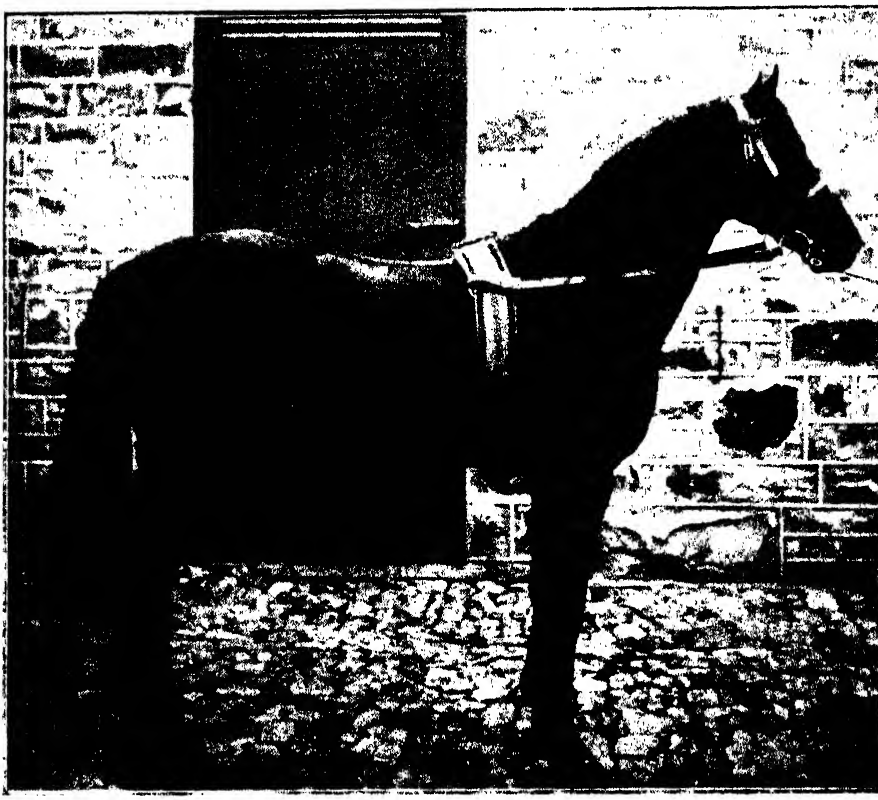
View of Potteberg Residence, showing some of the numerous outbuildings.

The Potteberg Estates.

It is now barely five years since Mr. Ohlsson actually acquired this property intact, as it had to be purchased piecemeal from about eighteen or twenty different owners, which naturally necessitated very great patience, and an immense amount of determination, in many cases it eventually becoming necessary to pay fancy prices in order to secure the property intact, or in one uninterrupted block of land.

The property as it now stands, is in extent about 80,000 (eighty thousand) acres, and may be roughly described as a peninsula with the sea coast as boundary on the south-west and south-east, the eastern and north-eastern boundary being the Breede River, which is impossible to cross at any time except by boat. The river here is navigable for small steamers and sailing vessels for about 30 miles from the mouth. The whole of the Potteberg mountains practically lie within the property, the length of the so-called peninsula extending from Cape Infanta for a distance of about 30 miles in a direct line towards Swellendam.

Prior to Mr. Ohlsson's occupation of these farms—although owned by at least 18 owners, who in their turn had numerous bijwoners or squatters —nothing whatever had been done in the way of improvements, the



"Pet Slave." Imported thoroughbred Stallion.

former inhabitants generally eking out an existence from the little stock they owned, and the letting of grazing rights during the summer months to the Ruggens farmers; their motto apparently being, not "How much can we do," but "How little can we do to eke out an existence."

The buildings were, with one or two exceptions, generally comprised of what is known as "wattle and daub shanties, which, during the course of a year or two after Mr. Ohlsson's occupation, became ruins. In any circumstances, the buildings that did exist, at the time the properties were purchased were worthless, and practically unfit for the habitation of human beings. The farms may therefore be described, prior to Mr. Ohlsson's occupation, as a huge extent of undeveloped waste land.

I shall now endeavour to give a rough outline in brief of what has been done in the short space of three years, since Mr. Ohlsson was placed in a position to start developing the property, and had it not been for the fact that up to within the last eighteen months it was practically impossible to obtain labour (the trouble being that the nearest village is 32 miles distant) more than double the amount would in all probability have been carried out. Desperate attempts have been, and are still being, made to secure reliable experienced managers or sub-managers, but so far without success. This has naturally been a very serious drawback, and retarded progress, and to crown all, the great flood of December, 1906 (when 26 inches of rain was registered in 27 hours) washed away many a hard day's toil and costly work, causing the loss of over £3,000.

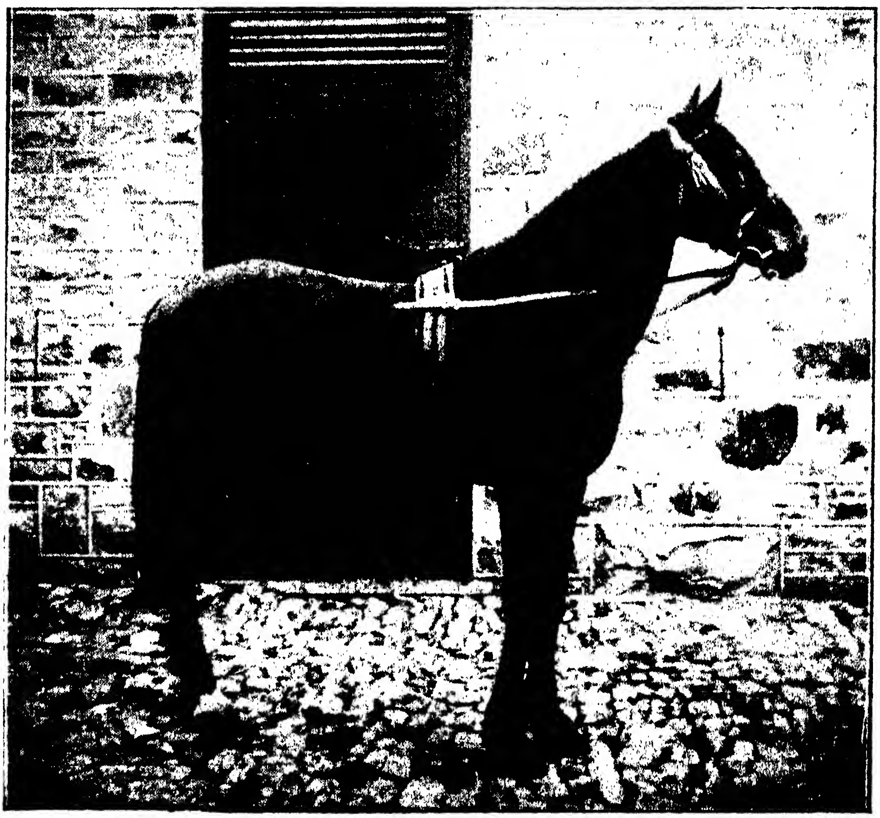
"Pasha." Imported Arab Stallion.

Buildings.

Six large and useful well-ventilated dwelling-houses have been erected at the various centres of the estate; twenty-eight shepherds and workmen's cottages have been built, dotted all over the property. Stable accommodation for over two hundred horses has been erected, and besides these many other outbuildings, such as forage stores, waggon sheds, mills, etc. All these buildings have been constructed of stone, and pointed in cement, of a very substantial nature, including every shepherd's cottage, which means that they have been erected for all time, and will require very little repairing for many a year to come.

Three magnificent circular sheep-dip tanks have been constructed with cement, at convenient distances apart, in any one of which it is possible to dip effectually three to four thousand sheep in eight or ten hours, and this has already been repeatedly done.

These buildings, every one of which is essential and necessary, have naturally cost thousands of pounds, and to give some idea of the enormous cost of carriage alone of goods and building material to these parts from the metropolis, I will mention one item, because of its bulky nature. The estate is about 180 miles from Cape Town, and although a cask of cement, which is manufactured about two hundred miles inland in Europe, is brought by rail to the sea coast, is then shipped and brought six thousand miles oversea, is landed in Cape Town, and purchased from the



" Victor." Colonial-bred Stallion.

merchant there for 10s. 6d. to 11s. per cask of 400 lbs.; but in order to get the cask of cement here on the Potteberg Estate, with a railway station 32 miles distant, the net cost is 23s., which means that the carriage alone from Cape Town is one or two shillings more than the cost of manufacture, carriage from Europe, agent's fees, dock dues, etc., merchant's profits, and all combined; or, on the other hand, the cask of cement works out at more than double the cost in Cape Town. Is it a wonder our progress in this country is slow, and yet we are told that our railways cannot be made to pay. Naturally, produce sent from here to the markets is similarly handicapped.

Fencing.

About eighty-five miles of very substantial fencing has been carried out, and the estate has been sub-divided into 25 large camps; these are again being sub-divided into smaller ones.

Tree Planting.

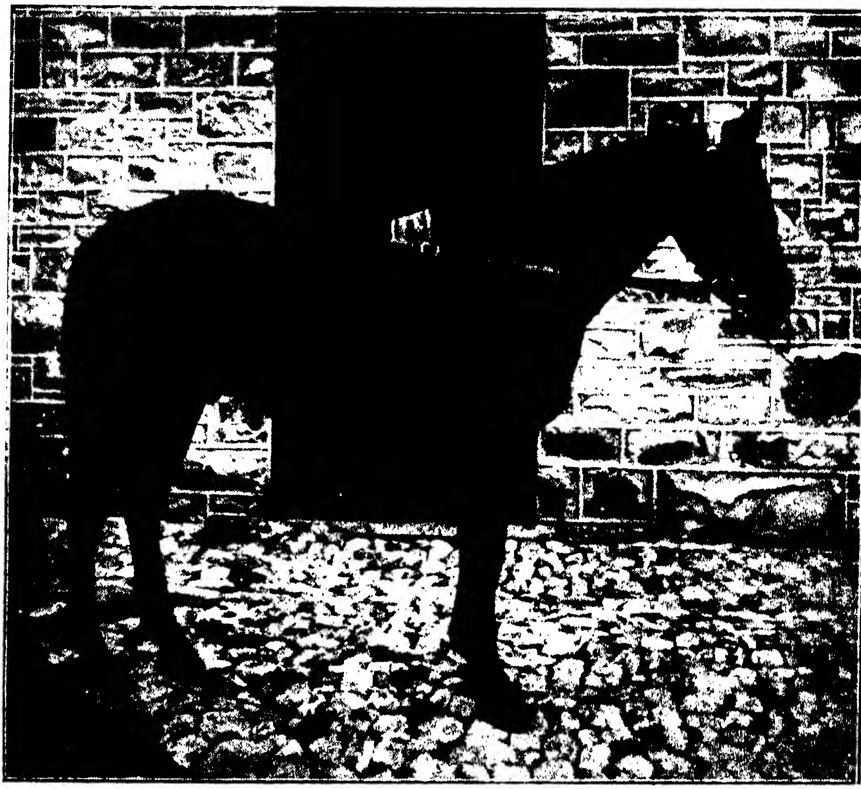
Between twenty and twenty-five thousand trees have been planted, and are growing luxuriantly, thousands of which are already beginning to make a very striking appearance all over the estate. The trees planted are principally of the Eucalyptus and Pinus varieties, all of which apparently thrive well, and especially the Sugar Gum (*Eucalyptus*

"Bravado." Imported Irish Hunter."

corynocalyx), and the *Eucalyptus cornuta*, which seem to do well in the very poorest of soil, and are great drought resisters. All that seems to be necessary is to protect them from cattle. Moisten the ground well in which they are to be set before planting, and once immediately after planting, and they require no further care. The best time to plant in these parts is immediately after a good soaking rain at any time during the months of August, September, or October. We have, however, planted them with success throughout the year, always watching our opportunity, when good soaking rains have

fallen. Our experience is that the best time to transplant the seedling is when it is from two to three inches high; when it reaches a foot or eighteen inches it does not do well, unless climatic conditions are very favourable, but generally it is a mistake to allow the seedling to exceed six or seven inches in height before planting out.

The object of these plantations is to afford shelter for stock during cold winter rains and heavy thunder storms, and more particularly to afford shelter for stock during the sweltering hot summer days, when the flying insect pests are at their worst, and the only protection an unfortunate animal has is to get into the shade. Trees have been planted and are growing luxuriantly upon land which is unfit for any other purpose, and where nothing else will grow.



"Red Berry." Imported Irish Hunter.

Gardens and Lucerne Fields.

Very great efforts have been made to grow lucerne and *Paspalum dilatatum*, and to some extent to very good purpose, but the land generally being of a very poor, sour, hard nature, or very sandy, it requires much manuring and large quantities of lime. This makes the progress in lucerne and paspalum cultivation very slow, the carriage on the necessary fertilisers being excessive. Up to the present, about twenty acres of lucerne and a few acres of *Paspalum dilatatum* are doing very well, but the scarcity of water, and the difficulty of obtaining fertilisers will materially retard the progress of extending operations to any great extent. But, nevertheless, year by year, a few acres are added,

the greatest difficulty being to get the lucerne and paspalum once established, and in some cases both the lucerne and paspalum have had to be re-sown or re-planted seven or eight times during the season, and very effective wind-breaks erected, to avoid the winds, which are so well known on the south coast, blowing the young struggling plants out of the ground in the sandy soil. The most effective protection we have as yet found, combined with wind-breaks, is to sow a crop of early barley on the land required to be sown with lucerne or paspalum, which land has been previously trenched about three feet deep (to prevent weeds from choking the young lucerne in its early stages). The barley crop is then cut off green and fed to the stock, leaving the stubble standing from six to eight inches high. The lucerne is then sown in the stubble, which gives it the necessary protection, and at the same time allows the sun, so much required by the young plants, to get at them. Many other ways have been tried, such as sowing the lucerne with oats and barley as a nurse crop, but none have turned out so successful as sowing it in the stubble. Lucerne will often do well in brak soil, but it requires perseverance and patience. A very effective way of turning brak soil to account is to plant it with rows of mangold wurzel the first season, and leaving the mangolds standing over to the next season. It will be found that the land is much improved, and much of its brakish nature has disappeared. Then without removing the mangold wurzel, sow the lucerne between the rows, and when the lucerne has had a good start, and has reached six or eight inches in height, remove the mangolds, feed your animals with them, and then sow the same rows with lucerne; the standing lucerne previously sown between the rows thus again affords protection to the younger crops. In this way much useless land has been reclaimed, and is giving good results. Land we have found must be very brak indeed if mangold wurzel will not thrive on it, and it seems to have the effect of removing much of the salt from the soil. Standing over for a season does not interfere much with its feeding powers, as we have fed pigs entirely on it, with good results.

Vegetables, and especially cabbage, turnips, mangolds, swedes, etc., etc., are grown for feeding man and beast.

Cereals.

Although prior to Mr. Ohlsson's occupation not more than five or six hundred bags of grain were ever grown upon this huge estate, we are expecting to reap, at the very least, between four and five thousand bags or muids this season, and naturally this will be increased year by year. Although it is impossible to find a market for grain, on account of the excessive cost of carriage, we feed it to the animals, and they in their turn are driven to the markets, and require no carriage, thus our grain goes to market.

Roads.

Many hundreds of pounds have been spent on roadmaking for the purpose of opening up and developing parts of the estate, which were practically inaccessible to man or beast before.

Stock.

The stock comprises horses, horned cattle, sheep, goats and ostriches. The estate is essentially a horse-breeding country, and up to the present the main development has been directed toward the breeding of horses, mules, and donkeys. I am enclosing photographs of a few of the stud animals.

The breeding mares at present number about 400 or over, sheep number about 6,000, ostriches about 600, horned cattle about 200, and donkeys about 100. Of the above, the horses, sheep, donkeys, and ostriches do fairly well. It is, however, hoped that when the farms are properly developed, and the growing of lucerne and other crops fairly established, that stock of all descriptions can be materially increased, as at present we have to rely upon bare veld grazing, which is very plentiful during eight months of the year, but the trouble arises with the remaining four.

Water.

The greatest difficulty which we have to contend with is the water question, and which, of course, is the difficulty throughout South Africa. The estate possesses several perennial streams, but these are generally situated where it is impossible to make use of them, without very great

"Kafir" and "Jack." Two Imported Catalonian Jacks.

expenditure, which would not be warranted by the possible return. Numerous dams have therefore been constructed, some of which are entirely constructed of cement, which became necessary in consequence of the nature of the soil being too porous for storage dams. About four miles of three-inch galvanised iron piping is at present being laid up for the purpose of taking water from where it is useless to centres where it becomes very valuable.

Game.

When these properties were purchased by Mr. Ohlsson they were practically denuded of game, and it was quite possible for anyone to roam about the estate for weeks without seeing a buck of any description, but by careful preservation and importation, together with the systematic destruction of vermin, game is now becoming very abundant. Besides the ordinary antelopes, Mr. Ohlsson has introduced at very great cost a variety of others, such as Red Deer, Fallow Deer, Blesbuck, Bontebuck,

Springbuck, Bushbuck, etc., all of which are doing exceptionally well. Red Deer thrives as well, if not better than they do in the North of Scotland. Many of these animals which have been introduced have cost as much as forty, fifty, and sixty pounds sterling per head.

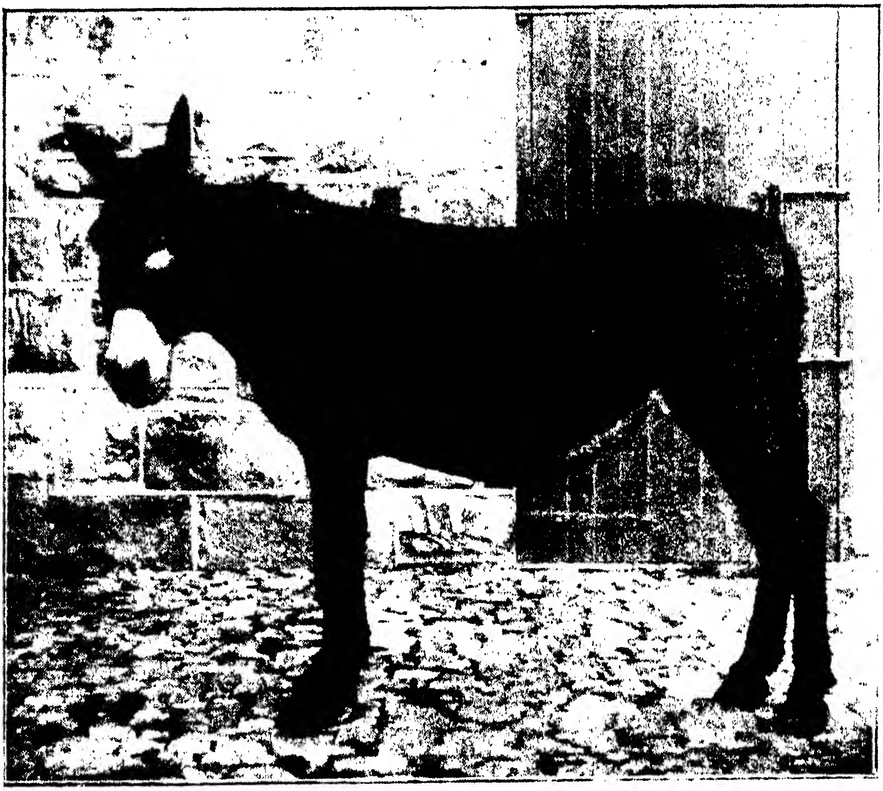
Vermin and its Destruction.

This estate practically being a wilderness prior to Mr. Ohlsson's purchase, had naturally become a perfect den for vermin of all descriptions, and espeecially red cat (lynx), jackal, wild cat, muishond, baboon, and ratel, and in order to breed and rear game and farm with sheep, it

"Faure" Imported Catalonian Jack. and "Christian De Wet." Colonial-bred Jack.

became necessary to set about systematically to destroy all vermin, which is gradually being accomplished. Every farmhand or shepherd is supplied with a certain number of traps, and is paid at the end of every month for the vermin destroyed, as well as for snakes of every species; and besides this a magnificent pack of hounds, which have been reared and kept at very great expense, are kept at work continually.. The consequence is that during the last two years over seventy jackal, and over twenty lynx have been destroyed, and of the smaller vermin, such as ordinary wild cat, muishond, etc., several hundreds are destroyed per annum, and on an average from twelve to fifteen hundred snakes. The nature of the country here being about as rough as it is possible to find in any part of South Africa, generally speaking, the destruction of vermin

is no easy matter, but it is wonderful what can be accomplished with determination and energy. There is no doubt that the most effectual way of destroying or getting rid of the lynx and jackal is to use the right class of dog. The foxhound is all very well on good, easy-going country, where there are no inaccessible deep ravines and kloofs, no innumerable holes and inaccessible hiding places for jackal and red cat to get into, where you find that after a few hours' hard chasing you have lost the jackal or red cat, having done up men, horses, and dogs. It thus soon became apparent that a faster dog than the foxhound was required, and to obtain these, the Norfolk lurcher and Russian borzoi were imported.



"Sanna." Imported Catalonian Jennie.

These were crossed with the foxhound, and a good, very fast, dog has resulted, which gives the jackal very little chance when once he has been scented. The pack now consists of seventeen useful dogs, which will soon be increased to twenty-five, and I can with confidence say that the next twelve or eighteen months will probably see the extermination of jackals on this estate. While on this subject, I may state that the packs of mixed dogs of all breeds belonging to Messrs. Oudendall and the brothers John and Christoffel Swart, who are living in this neighbourhood, practically keep the Ruggens farms, between Bredasdorp, Swellendam, and Heidelberg, free of jackals, and are invaluable to these districts. Very few farmers on the Ruggens need now, nor do they, kraal their sheep at all. The result is so apparent that I need not comment thereon, as all intelligent farmers know the increased advantages gained by not kraaling sheep. The dog that is required for the destruction of the

jackal is the dog with good scent, and above all, speed, so that the jackal is run down before he reaches cover, and before your horses, dogs, and men are worn out with the chase.

Diseases.

Three years ago this estate was rampant with disease among animals of all descriptions, and especially scab in sheep and brandziekte in horses. I can confidently state that not one out of a hundred mares was free from the latter, and as for sheep, it would have been difficult to find one free from scab. We have the reverse now, and I think it would be impossible to find a brandziek horse or a scabby sheep on the place. This has been done by systematic dipping, cleansing, and disinfecting, and in a like manner have innumerable other diseases been stamped out, and especially in the case of dogs. Where it was impossible to keep dogs at all, we have now some thirty or forty dogs doing well, and as healthy as they can be.

I much fear that my original intention of giving you a short description has been very much exceeded, and much more may have been written which may have been of interest to your readers, but I think it would be wise to refrain from saying too much at present.

I may add that besides the Potteberg Estates, Mr. Ohlsson is carrying on extensive farming operations at the Oaks, Ceres, which comprise the farms Laken Vlei, Groote Rivier, Zwaarmond, Klipfontein, etc.—in extent about 30,000 acres. Much useful work is being carried out there, but the great bugbear of all is the difficulty in obtaining experienced managers, with sufficient energy and perseverance to assist Mr. Ohlsson in his very great and useful undertaking of such magnitude, where he has shown indomitable pluck and courage in battling against many serious losses and immense difficulties. That is the handicap, but he is still there, determined to make what he has commenced a success.

In my opinion, such determination and courage, if it does not lead to success, deserves all the success that one man can wish another. He has during these past hard years kept hundreds of people at work and from starvation, and for this alone he deserves the thanks of the public of South Africa. The time is undoubtedly coming when his great task and work will enlighten many. Farms take seasons and years to develop.

ANIMAL DISEASES—CONTAGIOUS AND INFECTIOUS.

Summary of Outbreaks of Contagious and Infectious Animal Diseases Scheduled under Act No. 27 of 1893.

Still under Quarantine on 31st October, 1908.

DISTRICT.	Anthrax.	Glanders.	Lungsickness.	Redwater.	Scabies	Sponsziekte.	Tuberculosis.	Totals
Alexandria	...	...	...	...	...	3	...	3
Cape	...	...	...	...	...	...	1	1
East London	...	...	3	...	...	2	...	5
Gordonia	...	...	2	...	...	...	...	2
Hay	...	...	1	...	...	...	...	1
Herschel	...	...	...	...	...	8	...	8
Humansdorp	...	...	...	2	...	3	...	5
Kenhardt	...	...	1	...	...	...	...	1
Kimberley	...	...	1	...	...	...	...	1
King William's Town	...	...	10	...	...	1	...	11
Komgha	...	...	7	...	...	1	...	8
Malmesbury	...	...	...	...	...	...	3	3
Namaqualand	...	1	...	...	...	...	...	1
Prieska	...	1	...	...	...	1	...	1
Somerset East	...	...	...	...	...	1	...	1
Stellenbosch	...	...	...	...	...	...	1	1
Stutterheim	...	...	3	...	...	1	...	4
Vryburg	...	...	3	...	...	...	...	3
Tembuland.								
Umtata	...	...	4	...	...	...	...	4
Engcobo	...	...	20	...	...	...	...	20
Mqanduli	...	...	30	...	...	1	...	31
Elliotdale	...	...	1	...	...	...	...	1
Transkei.								
Butterworth	1	...	11	...	...	1	...	13
Kentani	1	...	12	...	...	16	...	29
Nqamakwe	...	...	13	...	2	1	...	16
Tsomo	...	...	5	5	...	...	...	10
Willowvale	...	...	19	...	...	6	...	25
Port St. John's	...	...	8	...	...	...	...	2
Pondoland.								
Libode	...	...	2	...	...	...	...	2
Ngqeleni	...	...	6	...	...	...	...	6
Lusikisiki	...	...	3	...	...	...	...	5
Flagstaff	...	...	3	...	...	...	...	3
Tabankulu	...	...	27	..	...	...	...	27
East Griqualand.								
Mount Ayliff	...	...	6	...	...	...	...	6
Qumbu	...	...	17	...	...	...	...	17
Tsolo	...	...	26	...	...	...	...	26
Mount Frere	...	...	7	...	...	...	...	7
Maclear	...	...	1	...	...	...	...	1
Totals	2	2	248	7	2	45	5	311

J. D. BORTHWICK, Chief Veterinary Surgeon.

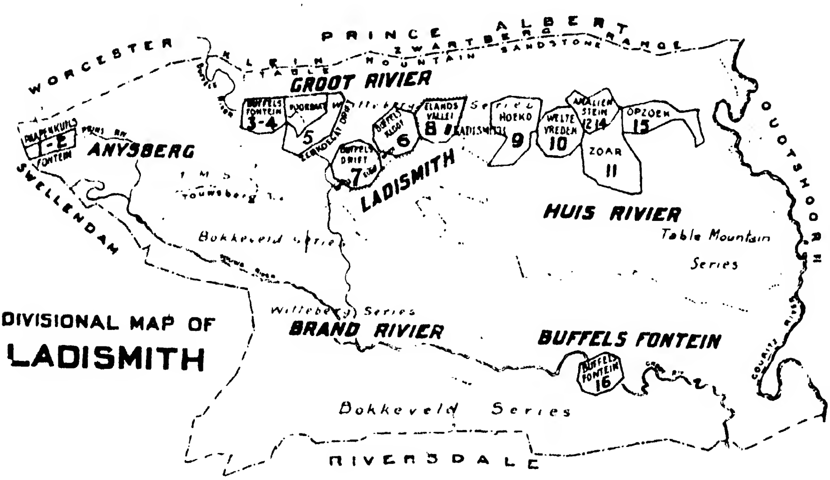
Office of the Chief Veterinary Surgeon,
Cape Town, 2nd December, 1908.

THE AGRICULTURAL SOILS OF CAPE COLONY.

INVESTIGATION AND ANALYSES.

By C. F. JURITZ, M.A., D.Sc., F.I.C., Senior Government Analyst.

(Continued from page 613.)



DIVISIONAL MAP OF
LADISMITH

MALMESBURY.

(Officially collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Mossel Banks Rivier.	Kalabas Kraal Station.	J. C. Watermeyer.
2.	Middle Zwartland.	Tweo Kuilen.	C. F. Juritz.
3.	”	”	”
4.	”	Vaderlandsche Rietkuil.	”
5.	”	Bloemendals Fontein.	J. C. Watermeyer.
6.	”	Rheboksfontein.	”
7.	”	Michiel Heyns Kraal.	”
8	”	”	”
9.	Groene Kloof East.	Klipfontein.	”
10.	”	Karnemelksfontein.	”
11.	”	”	”
12.	”	Alexanderfontein.	”

No.	Field Cornetcy.	Farm or place.	Collector.
13.	Groene Kloof East.	Rheboksfontein.	J. C. Watermeyer.
14.	,,	Platte Klip.	,,
15.	Honing Berg.	Geel Dam.	,,
16.	Zwartland.	Witkei.	C. F. Juritz.
17.	,,	,,	,,
18.	,,	,,	,,
19.	,,	Olifants Kuil.	,,
20.	,,	Geel Kuil.	,,
21.	,,	New Rush.	,,
22.	,,	,,	,,
23.	,,	,,	,,
24.	,,	Schildpad Vallei.	,,
25.	,,	Hooi Kraal.	,,
26.	,,	Zwartfontein.	,,
27.	,,	Vogelstruisfontein.	,,
28.	,,	Klein Zoutfontein.	,,
29.	,,	,,	,,
30.	,,	Zoutfontein.	,,
31.	Zwart Water.	Drooge Vlei.	J. C. Watermeyer.
32.	,,	,,	,,
33.	,,	Zwart Water.	,,
34.	,,	,,	,,
35.	,,	,,	F. Blersch.
36.	Zout Rivier.	Hazen Kraal.	J. C. Watermeyer.
37.	,,	Portugeeschfontein.	,,
38.	,,	Bosjesmans Kloof.	,,
39.	,,	,,	,,
40.	,,	Breek Muur.	,,
41.	,,	Leliefontein.	,,
42.	,,	,,	,,
43.	Schryvers Hoek.	Goelbeksfontein.	,,
44.	,,	Oostenwal.	,,
45.	Saldanha Bay.	Springfontein.	,,
46.	,,	Spanjaardsbosch.	,,
47.	,,	Cloetes Kraal.	,,
48.	,,	Lang Riet Vlei.	,,
49.	,,	,,	,,
50.	,,	,,	,,
51.	,,	,,	,,
52.	St. Helena Bay.	Muishondfontein.	,,
53.	,,	Eenzaamheid.	,,
54.	,,	Nooitgedacht.	,,
55.	,,	Schuitjes Klip.	,,
56.	,,	Uitkomst.	,,
57.	,,	Noodhulp.	,,
58.	,,	Holle Vallei.	,,
59.	,,	Klip Rug.	,,

The Malmesbury Division gives its name to the geological formation which extends over practically the whole of its area, and consists of a hard clay slate that ultimately decomposes to a loamy clay soil. The strata wherein these clay slates occur constitute what is commonly termed the Malmesbury series, and, as a rule, do not yield a rich soil. A more or less similar condition obtains all along the south-western corner of the Colony, the Bokkeveld series replacing the older Malmesbury formation in the

south, and these two formations stretch practically in succession from the Division of Piquetberg to that of Riversdale, both inclusive.

Intrusive in these Malmesbury clay slates are outcrops of granite, at such places as Saldanha Bay, Darling, Groene Kloof, Riebeeks Kasteel, Paardeberg, Groeneberg, Wellington, Paarl, Simonsberg, Stellenbosch, Somerset West, etc. The soils derived from this granite are very fertile when the rock whence they were produced has been thoroughly disintegrated and decomposed but not otherwise.

The two classes of soils above mentioned form the principal broad types of this division; they bear a general resemblance, therefore, to those of the Cape Division.

Proceeding from the village of Malmesbury, about ten miles in a north-easterly direction, two soils were collected from the farm Twee Kuilen. The occupant of the farm Vaderlandsche Rietkuil, where the next sample was taken, appeared to have progressed somewhat beyond the system of manuring by convenience noticed in some of the Cape Division farms:* he generally employed horse or sheep manure for fertilising his land, but declared that, according to his experience, the portion of the farm whence sample No. 4 was taken was sufficiently productive to need no other than

* See page 330.

horse manure. Two and three-quarter miles further to the north, from the comparatively small farm Witkei, situated 15¾ miles N.N.W. of Malmesbury and occupied by Mr. Gert Rust, three samples were collected. Mr. Rust—who has spent his entire life on the farm, and has kept a continuous farm diary for over a quarter of a century—states that on one part of his farm the crops had never yet been seriously attacked by rust, that rust had, in fact, very seldom so much as appeared on this part of his lands, and that, during seasons when most of his crops had been completely ravaged, the cereal crops in this particular locality had enjoyed entire immunity from the pest. The existence of such patches of land—where rust seldom or never appears, and where the crops, if attacked, suffer no serious damage—has not yet been satisfactorily explained. In many of these cases, such as that under immediate discussion, the chlorides have been found to be rather high; in others, the soil has appeared to be of an all-round better quality than the average. Of the samples of soil collected on this farm, one—No. 16 on the above list—was taken from lands that had been attacked by rust season after season, and the crops destroyed; another sample—No. 17—was taken from the rust-proof locality above mentioned. In this case it was noticeable that the underlying formation was largely calcareous. Both these samples were procured from lands which had been treated with horse and sheep manure. The third sample taken from this farm, No. 18, represents a virgin soil corresponding in nature to No. 16.

Journeying about four miles in a westerly direction from Witkei, the farm Olifants Kuil was touched at, and sample No. 19 taken. On this farm, it was said, rust had for the previous six or seven years effected a considerable amount of damage. From a spot three miles north-west of this, on the farm Geel Kuil—the southern part of the farm formerly bearing that name—another sample was taken, and then the northern portion of the old farm, now called New Rush, was visited: here three samples were collected. No. 21 was a sample of virgin soil, but Nos. 22 and 23 were both taken from ground that had been under cultivation for twelve years: of these two, the former represents the top of a hill where rust has occasionally made its appearance, but has never done much harm to the crops, while the latter was taken from a low-lying valley, a situation evidently much more subject to damp than that of the previous sample. As a matter of fact the field whence the last soil was taken is frequently visited by rust, which at that spot does considerable harm to the crop; nor can this excite much wonder when the situation is borne in mind.

Turning now the north-east, a sample of soil was obtained at a distance of four miles from the last—nearly five miles W.S.W. of Moorreesburg village, and 21 miles N.N.W. of Malmesbury—on the farm Schildpad Vallei. Here, as in a few former instances, a visitation of rust rarely occurs, and, when it does take place, effects comparatively little harm. The next soil, No. 25, was collected on the farm Hooi Kraal, from a point rather less than two miles to the north of Moorreesburg.

On the way back to Malmesbury, a sample, No. 26, was collected from the farm Zwartfontein, about 2¼ miles south-east of Moorreesburg, another from the farm Vogelstruisfontein, otherwise known as Drie Heuvel, nearly 5¾ miles south of Moorreesburg, and 16 miles north of Malmesbury. Two samples were then collected on the farm Klein Zoutfontein, at distances respectively 3⅓ and 4⅝ miles south-east of the spot where the previous sample was procured. The last sample of this tour was taken on the farm Zoutfontein, nearly ten miles due north of Malmesbury.

On a subsequent journey the first farm visited after leaving Malmesbury was Bloemendalsfontein, about 6½ miles north-west of the village:

there a sample of uncultivated soil, No. 5, a sandy clay, was obtained. At the farm Klipfontein, about 4¾ miles further west, No. 9, also an uncultivated soil, even more sandy than the previous one, was taken. Six miles north-west of this, on the farm Karnemelksfontein, two samples (Nos. 10 and 11) were secured from land which had lain uncultivated for six years, and was being prepared for the next season's sowing. At this spot the soil was clay of somewhat sandy nature. Mr. F. Duckitt, the owner of the farm, mentioned that here, on one and the same piece of land, the yield was apt to differ considerably; that of the low-lying portions being inferior to that of the higher ground; two samples were therefore taken, No. 10 from high ground, and No. 11 from a lower level, at spots within a few yards of each other, in order to ascertain whether any difference in chemical composition could be detected, or whether excessive moisture in the low-lying parts was the cause of the variation in the crop. Of the two soils, the former was found to possess a higher retentive capacity for moisture; it is also better supplied with lime, but in both cases potash and phosphoric oxide are very low. The hills about the village of Darling are, to a great extent, granitic, and, although the farm of Mr. C. Duckitt, The Towers, was visited, the granitic grain land was altogether omitted, nor was any sample of the clay soil taken here, as a sample (No. 12) of soil of the same type was procured four miles north-west of Karnemelksfontein, at Alexanderfontein, the farm of Mr. M. Duckitt, from land which was being prepared for the next season's use, after having been uncultivated for four years. On proceeding to the farm Rheboksfontein, 3½ miles west of Alexanderfontein, and principally granitic soil, a sample, No. 13, of clay soil was obtained; this soil had been uncultivated for three years. On the farm Platteklip, 2½ miles north of Rheboksfontein, a sample of sandy clay soil, No. 14, was collected; this had not been cultivated for one year, but was being prepared for the next season. These last three soils are alluvial clays, No. 14 being evidently affected by the granite which underlies them all: this also manifests itself in the smaller percentage of lime and the higher proportion of potash that it contains. On the farm Droogevlei, two miles north-west of Platteklip, two samples, Nos. 31 and 32, about one hundred yards apart, were taken from land said to be extremely fertile, lying to the north of a saltpan. The first soil was a greyish-coloured stiff clay, which proved to be rich in lime and potash, and contained a fair quantity of phosphates; the second, a lighter, more or less sandy clay of a reddish colour, contained a moderate amount of lime and potash, but proved decidedly poor in phosphoric oxide. This soil is reputed to be rust-resistent, and is cultivated without manuring. On the farm Zwartwater, about a mile to the north-west, No. 33, a soil similar in appearance to No. 31, was taken for comparison; it was found to be chemically much the poorer. Why these soils should be superior to others as regards immunity from rust, does not appear from the chemical analyses. The position of this soil with respect to the adjoining saltpan is similar to that of No. 31. The next sample, No. 34, was taken from sandy soil, 1¼ mile further north-west, and not rust-resistent. This soil had not been cultivated for three years, and is never manured. Practical experience had found it poorer than the preceding sample, and chemical analysis confirms this, although the difference is not great. In this neighbourhood too farmers have frequently observed that, while the surrounding crops are affected by rust, certain patches of ground year after year escape visitation, or, when affected, do not suffer greatly. It was from such a patch that sample No. 35 was taken. The particular patch extends over about 40 or 50 acres; it had never been manured, and was used for the cultivation of wheat every alternate year, lying fallow in the intervening years. Proceeding from this farm, a sandy tract is

entered upon, which stretches as far as the coast, about nine or ten miles. Underlying the stratum of sand, which is two feet or more in depth, is a bed of limestone. This limestone bed had already been noticed on the farm Klipfontein.

From the farm Geelbeksfontein, about 9½ miles north-west of Zwartwater, a sample, No. 43, was collected, consisting of hitherto uncultivated humus soil, which was to be sown upon, without manuring, the next season. The only other grain land in this vicinity is granitic. This humus soil as well as most of the sandy soils, and the limestone soils which will be mentioned presently, is simply ploughed and sown immediately, not being fallowed previously, as has been the practice with the clay soils: in this case, apparently, the opinion is that the productiveness of the soil renders fallowing needless. At Oostenwal, 7½ miles north-west of Geelbeksfontein, a sample of virgin soil, No. 44—a mixture of limestone with granitic soil—was taken. This soil is also cultivated without manuring. The soil of the adjacent farm, Meeuwklip, resembles that of Oostenwal; at Karnberg sandy soil is again met with, limestone being not far below: over Zoutkuil to Springfontein, about nine miles north-east of Oostenwal, where No. 45 was collected, the sand diminishes and the limestone increases. At Springfontein the limestone is exposed to such an extent that the surface of the otherwise hard material has become sufficiently friable to be easily cut up by the plough, and mixed with the inch or two of sand that covers it. This soil is sown without manuring, and farmers who were questioned on the subject, including the occupant of Springfontein, state that the limestone soil to a great extent withstands the rust, and that, at times, when the grain sown on the sandy soil is almost entirely destroyed by rust, that on the lime soil is only slightly affected.

Leaving Springfontein, and passing over Kersbosch and Klipfontein to Spanjaardsbosch, about six miles north of Springfontein, the soil becomes more sandy, and is here of about the same appearance as that of Zoutkuil and Karnberg further to the south-west. From Spanjaardsbosch a sample (No. 46) of uncultivated sandy soil, having somewhat of an admixture of lime, was collected. Thence the journey was directed to Cloete's Kraal, about 3½ miles north of Spanjaardsbosch, where the soil loses its very sandy nature, and here also a sample (No. 47) of uncultivated soil was procured. The next farm is that of the Brothers Kotze, Lang Riet Vlei, at Berg River, about five miles east of Cloete's Kraal. Here, at the request of Messrs. Kotze, four samples were taken at spots pointed out by them, namely: No. 48, "Vaalbosch" ground, where the Cape salt bush grows luxuriantly, a dark grey, somewhat stiff clay soil; No. 49 a looser and lighter clay, said to be the richest grain land on the farm; No. 50, a sandy soil, low-lying and yielding poor returns; and No. 51, a sandy soil, similar to the previous one, at a higher situation, and yielding better crops physically as well as chemically it proves to be the better soil of the two.

Between Lang Riet Vlei and Hazenkraal, about eight miles south-east of the former, alluvial vlei deposit stretches all the way along the Berg River, skirted by sand. The way from Hazenkraal to the village of Hopefield lies along the bed of the Zout River, and the elevated land, under cultivation on either side of the river bed from here to Hopefield, is a coarser sandstone formation than that previously passed over, no indications of the presence of limestone being noticed. A sample of this soil, No. 36, was taken from uncultivated land at Hazenkraal, and again, nearly four miles south of this, No. 37, at Portugeeschfontein. The former of these two samples contains a slight admixture of clay. These were the last samples taken on this tour, for on leaving Hopefield the Malmesbury

clay beds are almost immediately entered upon. These soils afford a fair idea of the grain country from Darling to Saldanha Bay, and thence to Hopefield. The intermediate sandy country is mainly devoted to cattle and sheep farming.

Regarding the non-manuring of the lands, the impression conveyed is that manuring is dispensed with wherever possible, as much owing to the want of a sufficiency of stable and cattle manure, as on account of the reputed fertility of the soil; but the fact cannot be too strongly emphasised that the richest soil is bound to be impoverished in course of time, if cultivated without manuring, and it behoves agriculturists to guard their interests, and attend to the quality of their lands, and merchants to place within reach of the farmer artificial fertilisers at as reasonable rates as possible, so that the farmer may learn their value, and the whole agricultural community, as also the country at large, may profit by the experience.

The final trip of this series was undertaken with a view to obtain samples from the St. Helena Bay district, and, at the same time, to supply the omissions of previous journeys, and thus render the investigation more complete. St. Helena Bay, it need scarcely be said, is an important grain-growing district, and the land, according to the farmers, is so fertile that it can be cultivated continuously without manure, the chief obstacle to success being the low rainfall.

The samples collected on this journey are detailed below. A light clay soil, No. 6, was taken on the farm Rheboksfontein, about five miles north of Malmesbury. No further samples were collected in this neighbourhood, as, with those previously collected, the work had been practically completed as regards the Middle Zwartland farms. Proceeding northwards, a stiff clay soil, No. 15, was collected on the farm Geeldam, a portion of Holle Rivier, seven miles from Moorreesburg in a north-easterly direction. About nine miles north-west of this Nos. 38 and 39 were taken on Mr. M. Karsten's farm Bosjesmans Kloof; the former of these two is a light clay, the latter a very stony clay soil. In Mr. Karsten's experience No. 38 is the poorer. On the farm Breek Muur, which borders on the Berg River, and lies six miles north-west of Bosjesmans Kloof, sample No. 40 was taken. Here the soil is more sandy in character, being, in fact, a sandy loam. Eight miles south-west of this, on the farm Leliefontein, sample No. 41 was taken; this is a stiff white clay, somewhat stony, but said to be very fertile. The lime and nitrogen in this soil are satisfactory in amount, and the potash fair, but phosphates are deficient. On the same farm, about 2¼ miles further south-west, sample No. 42, a sandy loam, was collected. The farmers in this part use stable manure, and also guano and artificial fertilisers in small quantities.

Before reaching the St. Helena Bay area, the farm Eenzaamheid, about 16 or 17 miles north-west of Hopefield, was visited. Two samples, Nos. 52 and 53, were taken here; the former on the portion of the farm known as Muishondfontein, and the latter about two miles further west on Eenzaamheid proper. The soil here is sandy, resembling that of Spanjaardsbosch. The farm Eenzaamheid, and other farms forming the inland boundary of the Field-Cornetcy of St. Helena Bay, are situated on a low-lying, sandy flat, whilst, with the exception of a narrow strip of similar sandy flat along the coastline, the other farms lie at elevations of probably 500 to 700 feet, upon and around granitic hills, the highest of which may be 900 feet. The soils of this part are, therefore, mostly granitic. The first sample taken here, No. 54, was from the farm Nooitgedacht, portion of Patrysberg, about five miles north-east of Vreden-

burg; and seven miles north-west of this, on the farm Schuitjes Klip, sample No. 55 was taken. These two soils are of a rather sandy nature. On the farm Uitkomst, adjoining Schuitjes Klip, and about 2½ miles to the south-west, sample No. 56, a clay soil, in appearance resembling the clay soils about Malmesbury, was collected. Judging by its agricultural returns, this soil was expected to yield good analytical results, and it certainly does show, in addition to a fair proportion of nitrogen, more lime, potash, and phosphoric oxide than any other soil collected within the Field-Cornetcy. The three soils which complete the circuit in the neighbourhood are sandy loams, clay being more in evidence on the farms west of Uitkomst than on those east of it. No. 57 was taken on the farm Noodhulp, three miles south-west of Uitkomst, No. 58 on the farm Holle Vallei, about 6½ miles south-east of Noodhulp, and No. 59 on the farm Kliprug, about three miles south-east of Holle Vallei. The reputation of the soil is good; chemically it shows a normal proportion of nitrogen, and, although poor in phosphates, it contains fair amounts of lime and potash.

It remains to add that samples 7 and 8 were taken on the farm Michiel Heyns Kraal, eight miles south-west of Malmesbury: this is not a grain, but a dairy farm. No. 7 represents a loam and No. 8 a humus soil. No. 1, a sandy loam, was taken from Crown lands at Kalabas Kraal Station, seven miles north-east of the farm Lange Rug in the Cape Division; it represented the only uncultivated ground in the vicinity. All the samples collected on this journey represent virgin soils.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
60.	Mosselbanks Rivier.	Kalabas Kraal.	D. E. Hutchins.
61.	,,	,,	,,
62.	,,	,,	,,
63.	,,	,,	,,
64.	,,	,,	,,
65.	Groene Kloof East.	Alexanderfontein.	J. P. Cloete.
66.	,,	,,	,,
67.	,,	,,	,,
68.	,,	,,	,,
69.	,,	,,	,,
70.	,,	,,	,,
71.	Middle Zwartland.	Leliefontein.	C. Nelson

From the Kalabas Kraal Outspan five samples were taken: No. 60 represents the subsoil from a hill top, and No. 61 the surface soil at the same place. No. 62 represents a light loam from the valley, and Nos. 63 and 64 are sands, the former being from sour veld and the latter mixed sand from the river bed.

While travelling through the Malmesbury Division in connection with the collection of the samples mentioned in the previous list, attention was frequently directed by the local farmers to numerous slight elevations, from one to four feet in height, and twenty or more yards in diameter; the soil of these hillocks—called "heuveltjes" by the farmers—was alleged to be extremely rich, and cereals of all kinds were said to grow on them with luxuriance; while on the lower ground, between the elevations, the soil would be poor and produce scanty crops. It is not customary—so it is asserted—ever to manure these hillocks, and some lands are alleged to have grown wheat for nearly a century without the hillocks either receiving any manure or becoming exhausted. Mr. J. P.

Cloete, of Alexandersfontein, through whose good offices specimens of hillock and other soils were procured for comparative analysis, stated that for the last four years he had been urging farmers to use lime largely on the poor cold soils between the hillocks, and he quoted instances of very poor lands having yielded heavy crops of wheat by the aid of a good dressing of lime.

In order to ascertain by chemical analysis what difference, if any, existed between the hillock soils and those of the lower levels, samples of each were specially collected and analysed. Those from hillocks are numbered 65, 66, and 67, and those from the level below 68, 69, and 70: all of these were taken from lands that had been cultivated. In every case the soils taken from the low-lying ground proved to be exceedingly poor in lime, and herein lies the great difference between the hillock soils and those below, curiously enough tending to verify Mr. Cloete's prognostications. Even the hillock soils Nos. 66 and 67 are rather deficient in lime, although considerably superior to the lower soils. No. 65 contains lime in fair amount. The potash present in the hillock soils is fair in quantity, but in this respect No. 69 is poor, while Nos. 68 and 70 show a moderate proportion, although in each case poorer than the corresponding samples from the hillocks. As far as phosphates go, there is a fair proportion in the hillock soils, but the other three are rather poor. These few analyses tend to confirm the popular idea; and yet the difference all round is not as striking as some of the statements made might possibly have led one to expect. To this last observation there is just the exception already noted—that of the lime. Physically as well as chemically, the hillock soils appear to be slightly superior: in water retentive capacity their average stands higher than that of the soils around, a point also noted in connection with the soils collected on the farm Karnemelksfontein (*vide* p. 747). There is, moreover, a better proportion of organic matter in the hillock soils than in the others, and the former are likewise the richer in nitrogen. Without unduly pressing the points of difference, the inferiority of the low-lying soils also comes out in the amounts of chlorine they contain, in as far as these amounts indicate tendency to become brack: all along the line, therefore, the hillock soils have points in their favour.

Reverting for a moment to the soils from Karnemelksfontein, it may be observed that there too the hillock soil was the better, not only in water retaining capacity, but likewise in organic matter and nitrogen, and there too the chief difference lay in the proportion of lime.

Another instance of comparative analyses of hillock and level soils will be briefly referred to in connection with the farm Groenberg in the Paarl Division.

Under all the circumstances it seems quite feasible that the process of levelling down the hillocks—said to have been attended with general improvement of the land in some instances—may have led to an all-round increase in fertility, notably where these hillocks have been numerous. It seems also reasonable to suppose, from what these results reveal, that an addition of lime would lead to an improvement. Speaking of carbonate of lime as a dominant factor in soil productiveness, Professor Hilgard observes:—*

"Its presence exerts a dominant and beneficial influence in many respects, as is readily apparent from the prompt change in vegetation whenever it is introduced into soils deficient in it."

* Hilgard: "Soils; their formation, properties, composition and relations to climate and plant growth," 1906, pp. 353, 354.

In the Malmesbury Division there are several outcrops of carbonate of lime, for instance on the farms Droogc Vlei (Field-cornetcy Zwartwater), Geelbeksfontein (Field-cornetcy Schryvers Hoek), Springfontein and Lang Riet Vlei (Field-cornetcy Saldanha Bay). Even if levelling-down does not achieve the desired result, there should be abundance of lime near at hand on which to draw for a supply.

The existence of these hillocks in various parts of this Colony has been attributed to insects—ants, presumably. In this connection attention may be directed to the following:—

"The work of ants is in some regions on so large a scale as to attract the attention of the most casual observer. Especially is this the case in portions of the arid region, from Texas to Montana, where at times large areas are so thickly studded with hills from three to twelve feet in diameter, and one to two feet high, that it is difficult to pass without being attacked by the insects. The 'mounds' studding a large portion of the prairie country of Louisiana seem also to be due to the work of ants, although not inhabited at present."†

The last sentence seems to fit exactly the conditions of the Cape "heuveltjes."

The results of the analyses of the soils from the Malmesbury Division are tabulated below:—

(Method II.)

	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through 3 mm. Sieve.		
No.	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
1.	·30	·85	·0006	·014	·059	·041	·016
60.	1·11	2·22	·0101	—	·064	·026	·041
61.	·22	·44	·0024	—	·037	·018	·052
62.	1·46	2·40	·0056	—	·097	·044	·038
63.	·34	·52	·0025	—	·046	·025	·034
64.	1·23	1·28	·0070	—	·060	·023	·023
2.	·49	1·90	·0003	·061	·056	·107	·051
3.	·68	2·47	·0003	·078	·092	·171	·071
4.	1·16	5·24	·0008	·095	·136	·128	·064
5.	·14	1·07	·0004	·050	·059	·038	·025
6.	·91	2·91	·0014	·091	·049	·031	·030
7.	·67	2·30	·0011	·070	·168	·039	·038
8.	7·16	15·36	·0056	·252	·369	·033	·080
9.	·17	·95	·0008	·067	·039	·042	·033
10.	1·03	4·44	·0014	·089	·147	·059	·041
11.	·29	2·16	·0006	·072	·062	·064	·022
12.	·49	3·12	·0010	·129	·081	·035	·045
13.	·80	4·16	·0032	·117	·095	·098	·048
14.	·56	2·24	·0012	·035	·046	·102	·050
15.	·94	2·50	·0009	·063	·064	·074	·032
16.	·98	3·60	·0022	·117	·160	·130	·056
17.	·80	1·86	·0347	·072	·056	·077	·044
18.	1·05	2·79	·0010	·095	·108	·101	·051
19.	·62	2·68	·0004	·056	·104	·062	·038
20.	1·23	4·02	·0007	·033	·036	·119	·035
21.	·60	2·99	·0012	·078	·028	·144	·071
22.	·58	2·61	·0010	·084	·082	·090	·064
23.	·59	2·53	·0081	·061	·098	·092	·051
24.	·46	2·04	·0002	·067	·060	·020	·074

† Hilgard: op. cit. p. 160.

(*Method II*)—continued.

No.	Percentage of Soil sifted through 1 mm. Sieve, Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through 3 mm. Sieve. Lime.	Potash.	Phosphoric oxide.
25.	·68	2·94	·0009	·084	·032	·033	·053
26.	·35	1·72	·0005	·072	·064	·042	·040
27.	·73	5·17	·0002	·100	·076	·090	·076
28.	·37	1·63	·0003	·056	·052	·042	·066
29.	1·68	3·17	·0005	·156	·068	·090	·063
30.	·31	1·76	·0002	·077	·036	·045	·086
31.	7·25	9·26	·0058	·140	1·991	·492	·063
32.	·93	2·14	·0057	·028	·156	·122	·028
33.	·78	1·81	·0025	·035	·125	·075	·033
34.	·48	2·04	·0017	·028	·108	·054	·039
35.	3·16	14·30	·018	—	12·07	·44	·17
36.	·24	1·06	·0050	·042	·024	·045	·124
37.	·17	·59	·0005	·021	·053	·018	·034
38.	·87	1·83	·0103	·091	·187	·066	·042
39.	1·08	7·90	·0042	·133	·010	·052	·058
40.	·70	1·55	·0020	·077	·046	·048	·042
41.	1·94	1·09	·0108	·126	·256	·075	·027
42.	·39	1·20	·0009	·035	·039	·026	·038
43.	1·85	16·26	·2258	·325	1·159	·443	·180
44.	·78	3·29	·0013	·042	·364	·124	·052
45.	·52	2·43	·0016	·035	4·715	·058	·025
46.	·42	·94	·0015	·049	·231	·037	·075
47.	1·17	2·59	·0006	·049	·220	·068	·055
48.	1·98	2·97	·0147	·070	1·826	·182	·053
49.	·58	1·31	·0022	·047	·073	·063	·027
50.	·20	·54	·0006	·028	·063	·046	·025
51.	·51	1·01	·0008	·028	·114	·061	·034
52.	·41	·68	·0006	·084	·084	·042	·048
53.	·35	·67	·0010	·056	·034	·035	·027
54.	·47	1·12	·0009	·049	·062	·046	·027
55.	1·01	2·53	·0093	·035	·015	·021	·050
56.	2·32	3·48	·0017	·091	·418	·105	·094
57.	1·86	2·55	·0011	·077	·165	·062	·046
58.	1·28	4·82	·0024	·084	·043	·039	·027
59.	1·94	4·30	·0016	·112	·139	·060	·045

(*Method I.*)

No.	Percent. of Field Sample. Fine earth.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through ½ mm. Sieve. Lime.	Potash.	Phosphoric oxide.
65.	72·0	1·57	5·83	·0106	·175	·146	·121	·061
66.	73·8	1·15	3·18	·0078	·189	·072	·075	·072
67.	80·0	1·47	5·01	·0042	·126	·096	·095	·073
68.	72·2	1·01	4·33	·0261	·119	·014	·114	·049
69.	68·0	1·09	2·64	·0159	·112	·014	·045	·028
70.	76·0	1·28	4·30	·0078	·119	·014	·095	·055
71.	31·8	·28	1·95	·0071	·091	·032	·020	·017

In the Malmesbury grain soils, as in those of the Cape Division, the great lack is phosphatic material, and potash is almost as urgently needed; at the same time it must be said that, not only in proportion to the lime present, but also absolutely, the amount of phosphoric oxide is higher in the Malmesbury than in the Cape Division, and seems to continue increasing in amount as one travels northward from Tygerberg to Zwartland.

It is noteworthy that the surface soils which are more or less influenced by the underlying lime deposits—such as those at Drooge Vlei, Geelbeksfontein, Oostenwal, and Uitkomst—in addition to containing more lime than the other soils, are also richer in potash. The ultimate origin of the comparatively large amount of potash in the soils of this class is a point of some interest which it is worth while elucidating: it does not seem improbable that it is caused by the debris of granitic rocks being mixed with the compacted sand; from the blown sand itself the potash could certainly not have been derived.*

Out of 68 soils overlying the rocks of the Malmesbury series, collected in the Cape and Malmesbury Divisions, no less than 16 were deficient in all three inorganic plant food constituents in an available form; as many as 45 are poor in phosphoric oxide; and of these latter five also lack potash, and eight lime. Of the remaining 23 soils, eight were deficient in lime only, three in potash only, and five in both lime and potash. There were, therefore, only seven soils, of all those 68, that were not lacking in respect of one or other of the three mineral fertilising constituents, and even out of these seven, six were no better than fair all round.

MIDDELBURG.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
1.	Naauwpoort	Carlton.	Dist. Railway Engineer.

Amongst the characteristic features of the Beaufort geological series, the occurrence of bands of dark purple mudstones and shales may be noticed by any traveller by rail in those parts of the country where the rocks of the Beaufort series appear at the surface, for instance, between Naauwpoort Junction and Ludlow on the Midland Railways. References to these mudstones and shales may be found, *inter alia*, on pages 33 and 174 of the Geological Commission's Report for 1903, on pages 78 and 81 of the Commission's Report for 1904, and on page 98 of that for 1905.

These purple shales are exposed in various parts of the railway cuttings on the west of the railway line south of Carlton, and especially so just at the 262nd milepost. They frequently appear to be of a calcareous nature, and to investigate this point, some of the weathered and finely disintegrated shale was procured for analysis.. As the shale is found intermixed with limestone bands and layers of sandstone, no opportunity has been available of procuring any of this purple material in a sufficiently decomposed condition to form an actual soil by itself, but the above sample, taken from the cutting south of Carlton, represents the weathered shale in as finely divided a condition as it was possible

* A somewhat similar problem arises in connection with the soils of the farm Hoogekraal, Nos. 33 and 34 of the Cape Division soils (*vide* pages 330 and 333 of this volume). The point will be reverted to later when discussing the bearing which the geological relations of soils have upon the proportions of plant food which they contain: see Part V.

to procure it free from other rock material that could in any way modify the chemical composition of the sample.

In order to afford an idea of its state of sub-division, it may be mentioned that a mechanical analysis of the shale as collected gave the following results:—

Pebbles*	12·55
Coarse gravel	12·70
Fine gravel	36·55
Coarse sand	10·74
Fine earth (by difference)	26·75
Moisture	·71
Total	100·00

The chemical analysis of this sample yielded the following results:—

No.	Percent. of Field Sample. Fine earth.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through ½ mm. Sieve. Lime.	Potash.	Phosphoric oxide
1.	27·5	1·86	—	—	—	·476	·120	·126

It is obvious that the disintegration of these purple shales will produce a very fertile soil, and indeed it was the known fertility of soils into whose composition the shales had appeared to enter that led to the selection of this sample for analysis.

Mossel Bay.

(Officially collected.)

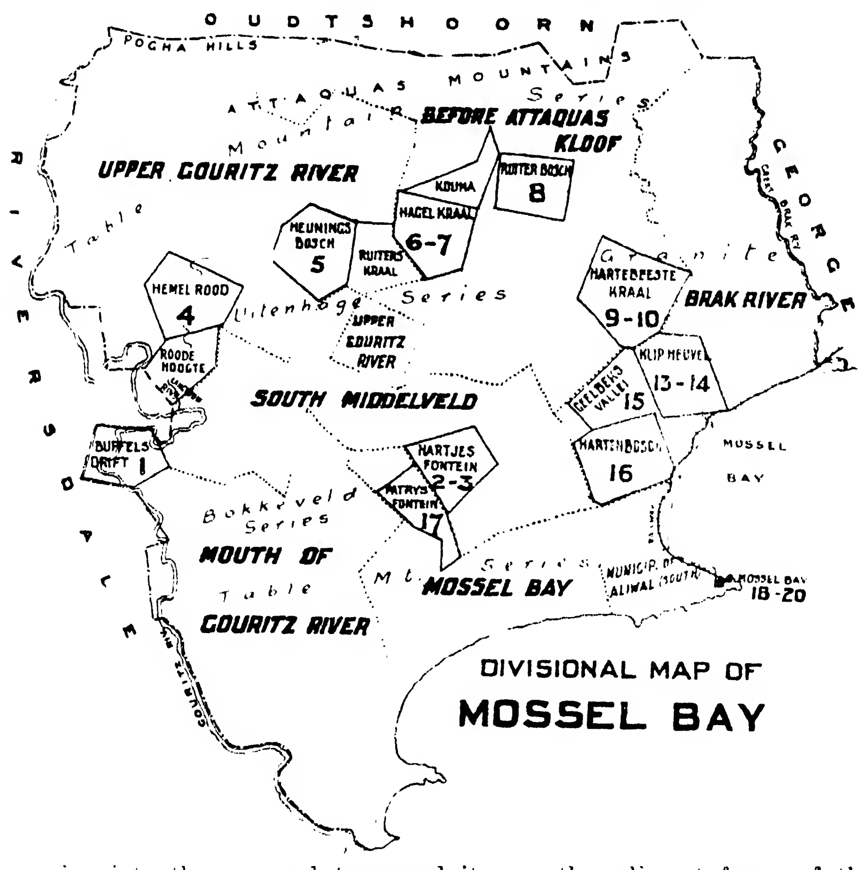
No.	Field Cornetcy.	Farm or place.	Collector.
1.	South Middelveld.	Buffels Drift.	J. Muller.
2.	,,	Hartjesfontein.	,,
3.	,,	,,	,,
4.	Upper Gouritz River.	Hemelrood.	,,
5.	,,	Heuningbosch.	,,
6.	Before Attaquas Kloof.	Hagel Kraal.	,,
7.	,,	,,	,,
8.	,,	Ruiter Bosch.	,,
9.	,,	Hartebeeste Kraal.	,,
10.	,,	,,	,,
11.	Brak River.	Great Brak River.	,,
12.	,,	,,	,,
13.	,,	Klipheuvel.	,,
14.	,,	,,	,,
15.	,,	Geelbeks Vallei.	,,
16.	,,	Hartenbosch.	,,
17.	Mossel Bay.	Patrysfontein.	,,

Entering the Mossel Bay Division from Riversdale, at the farm Buffels Drift, which lies on the boundary of the two divisions, a typical sample of river soil was collected, No. 1 in the above list. The Gouritz

* The signification of each of these terms will be explained later, under the head of "Physical composition of soils."

River flows midway through the farm, and the river bed widens out considerably at that point; extensive and very deep deposits of silt are washed down and deposited anew all along the river course, serving as an excellent soil for gardening. No. 1 forms a representative sample of such a deposit of very rich and deep soil, which, on most of the farms lying along this river bed, is brought under irrigation by air-motors.

The silt thus deposited by the Gouritz River is identical with that to which the whole of the Oudtshoorn Division owes its great fertility, being brought down—ultimately from the Karroo—by the Olifants River and other tributaries of the Gouritz. It is hardly open to doubt that, if some scheme could be devised to intercept by means of retaining weirs or otherwise, the rich Oudtshoorn silt which these rivers are constantly



DIVISIONAL MAP OF MOSSEL BAY

carrying into the sea, and to spread it over the adjacent farms of the Mossel Bay and Riversdale Divisions, great benefit to those areas would result.

Crossing the Gouritz River bridge, and leaving the main road, a course along the left bank of the river was taken, passing through Roode Hoogte, the very fertile farm of Messrs. Muller Bros., the soil of which is similar to that at Buffels Drift, lower down the river; then, proceeding up the left bank of the tributary Langtouw River, to the farm Hemelrood, better known as Herbert's Dale—quite a small village—sample No. 4, a loose red sandy clay, was collected on the right of the road before entering this village. It represents the predominating soil all along the valley, which, like several others, is well cultivated, mostly

for garden purposes, all sowing being done on the slopes of the surrounding hills, capped as they are with a fairly deep layer of rich "Karroo" soil.

On leaving the Langtouw River valley, a very hilly tract is traversed to Heuning Bosch, where No. 5, a sour soil, representing the upper and more mountainous parts, was taken from old lands adjoining those just under the plough. It was said to be a very poor soil, but yielded fairly satisfactory crops when manured with guano. The same type of soil is also to be found at Ruiters Kraal and Goedmoed. These poor soils are all derived from the sandstone formation to the north. Keeping along this ridge, a series of undulating plateaux is crossed over; they consist mostly of sour veld, with some occasional tracts of rich land, alternately "zwart turf" and natural red "Karroo" soil. Nos. 6 and 7, respectively typical of each, were secured at the farm Hagel Kraal. The "kweek" soil along the river is literally covered with the grass which obtains for it its vernacular appellation, and proves a great inconvenience and drawback to the growth of lucerne. At Roode Krans and Kouma a more or less similar soil is to be found, possibly somewhat more acid. At Ruiterbosch a sample of very acid soil, No. 8, was taken. Both at this farm and at Hagel Kraal, basic slag had been widely used as a fertiliser for cereals, but too sparingly, for it is a well-known fact that these acid soils, or "zuur veld" as they are locally termed, require principally lime and phosphates.

Between the last mentioned farm and Hartebeeste Kraal, there is not much sowing carried on; at the latter place, however, several varieties of soil were under cultivation, of which only two were selected, namely, No. 9, a "broken" red sour soil, not very fertile, and No. 10, a black sour soil, inferior to No. 9. These two soils were taken from above the mass of granite which commences north-west of Mossel Bay, and extends over a considerable portion of the George Division. The relatively large amount of potash in No. 9 is, not improbably, due to the felspar of the granite.*

From this point a course was laid for Great Brak River, the picturesque little hamlet situated on the river bearing that name, the boundary between the divisions of Mossel Bay and George; practically the whole of this hamlet is owned by Messrs. Searle Bros. In the valley on the right bank of the river, between the latter and the main road, there is a very level tract of an intermediate "broken vlei soil"; two samples were collected here, Nos. 11 and 12; the former of these is a loose, rather sandy clay, about nine inches deep, lying upon a bed of yellow clay; the other sample represents a loose sandy loam, which, after sowing for three successive years, becomes so "brack" or alkaline, that its owner is compelled, through poverty of the crops, to let the land lie fallow, for a year or two, until entirely covered with grass, when it is again ploughed over, well manured, and sown; fairly good results have thus been obtained.

At Klipheuvel there are several varieties of "broken vlei soil" under cultivation. Only Nos. 13 and 14, the former a rich dark loam, the latter a red sandy soil, were taken. Of these two soils, the latter has constantly been subject to visitations of rust; it is in every respect chemically the poorer soil of the two. Proceeding about three or four miles south-east of Klipheuvel, sample No. 15, a loose brack soil, was collected from the farm Geelbeks Vallei. The proportion of chlorine, it will be noticed from the following table, is higher than in any other of the Mossel Bay Division soils analysed. Sample No. 16, a light, yellow

* A reference to this feature has already been made in connection with the Malmesbury soils.

soil, with alkaline patches here and there, was taken from lands adjoining the roadside, on the farm Hartenbosch. Journeying almost due west from the last mentioned farm, over several varieties of "broken" soil, to Hartjesfontein, more commonly known as Matjes Drift, some very fertile varieties of alluvial clay soil were found. No. 2 is a good "Karroo" soil, while No. 3 is a dark loose clay, said to be very fertile. It is probable that this fertility is due to the lime present in the soil, the proportion being the maximum for the Mossel Bay Division. Nos. 2 and 3 represent the two classes of soil mostly under cultivation here. There is also a third variety, locally known as "vaal grond," but not equally extensively cultivated. The last sample taken in this division was No. 17, a loose gravelly clay soil, from the farm Patrysfontein. The range of hills south of this is composed of sandstone, and forms the natural boundary between the central belt of country, and the sand dunes which stretch along the coast. The comparative poverty of the Hartenbosch and Patrysfontein soils is evidently due to the influence of the sandstone.

(Privately collected.)

No.	Field Cornetcy.	Farm or place.	Collector.
18.	Mossel Bay.	Mossel Bay.	C. W. Black.
19.	,,	,,	,,
20.	,,	,,	,,

These soils were taken from the Public Park at Mossel Bay, where the underlying geological formation is Table Mountain sandstone; they all represent poor sandy soils, No. 18 containing an admixture of a small proportion of clay.

The analyses of the soils enumerated in the foregoing lists are tabulated below:—

(Method III.)

No.	Percent. of Field Sample. Fine earth.	Percentage of Soil sifted through 1 mm. Sieve. Water.	Organic matter.	Chlorine.	Nitrogen.	Percentage of Soil sifted through ½ mm. Sieve. Lime.	Potash.	Phosphoric oxide.
1.	97·0	2·52	6·29	·0062	·056	·43	·39	·13
2.	93·6	2·99	4·87	·037	·043	·23	·46	·070
3.	92·2	6·95	10·24	·035	·17	·59	·87	·12
4.	93·6	1·58	3·54	·011	·028	·10	·39	·074
5.	75·6	2·52	4·98	·016	·042	·16	·20	·054
6.	95·2	2·66	5·67	·011	·030	·15	·25	·11
7.	88·2	2·75	4·47	·040	·17	·13	·36	·059
8.	95·2	1·97	4·17	·012	·044	·15	·080	·064
9.	81·6	3·52	5·68	·032	·056	·15	·63	·074
10.	54·2	·92	2·47	·0071	·031	·13	·18	·061
11.	93·4	2·73	5·01	·0079	·046	·39	·58	·056
12.	95·2	1·97	6·29	·047	·044	·30	·34	·10
13.	79·0	2·12	4·41	·044	·057	·31	·56	·092
14.	94·0	1·05	2·13	·044	·029	·15	·26	·058
15.	92·6	2·21	5·71	·057	·056	·40	·76	·15
16.	79·4	·46	·89	·021	·045	·11	·14	·046
17.	82·6	·78	2·29	·026	·13	·10	·13	·033

(Method II.)

No.	Percentage of Soil sifted through 1 mm. Sieve.				Percentage of Soil sifted through 3 mm. Sieve.		
	Water.	Organic matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric oxide.
18.	1·15	3·95	·0014	·123	·125	·076	·038
19.	·37	1·66	·0011	·016	·051	·026	·017
20.	·81	·66	·0026	·084	·055	·049	·019

It is to be expected that the method whereby most of the soils from this division have been analysed will yield higher proportions of lime and potash than in the case of soil-extraction by Method I.; to exemplify this the analytical results given in the above table for the poor sour soil at Heuning Bosch (No. 5) should be compared with the analyses of similar sandstone-derived soils extracted by Method I. The results obtained from the Hartenbosch and Patrysfontein soils (Nos. 16 and 17) should also be thus compared.

(To be continued.)

MILK RECORD

ELSENBURG COLLEGE HERD.

Subjoined is the Milk Record to the 30th November, 1908:—

Breed and Cow.	Days in Milk.	Yield in Lbs. During November.	Total to date.	Daily Average.
FRIESLANDS.				
Cleopatra	284	507	10,155	34·75
Romula	259	576	7,598	29·33
Victoria	249	791	7,985	32·06
Bell	143	973	5,649	39·50
Violet	123	865	4,388	35·67
Rose	102	1,088	4,213	41·30
JERSEYS.				
Nora	304	314	5,067	16·66
Gladys	203	603	4,775	23·52
Gertie	165	615	4,139	25·08
Rosa	143	295	2,296	16·05
Grace	137	545	2,821	20·59
Gwendolen	106	401	1,516	14·30
Gilliflower	94	806	2,923	31·09
SHORTHORN.				
Maggie	143	824	4,886	34·16
AYRSHIRES.				
Cherry	186	305	3,753	20·12
Lobelia	161	505	3,794	23·56
Queen Dot	153	475	3,450	22·54
CROSSES.				
Bessie	384	639	12,073	31·44
Disa	259	480	5,378	20·76

INTER-COLONIAL AGRICULTURAL UNION.

ANNUAL CONFERENCE, 1908.

HELD AT BLOEMFONTEIN ON WEDNESDAY AND THURSDAY, NOVEMBER 25 AND 26.

The Fourth Annual Conference of the Inter-Colonial Agricultural Union of South Africa was opened in the Town Hall, Bloemfontein, on Wednesday, November 25. The President, Mr. C. G. Lee (Cape), presided, and was supported on the platform at the opening ceremony by the Hon. C. H. Wessels and the Rev. Jas. Scott (Natal).

The Delegates.

The following Delegates were in attendance:—Natal: Messrs. Rev. Jas. Scott, W. Craig, E. W. Evans, Jas. King, C. H. Mitchell, F. A. R. Johnstone, T. Burman, H. Wiltshire, H. Bazley, also Mr. H. Watkins Pitchford, bacteriologist. Cape: Messrs. C. G. Lee, A. H. Guthrie, O. E. G. Evans, E. T. L. Edmeades, E. A. Edmeades, R. H. Struben, C. A. Pope, A. P. de Villiers, P. J. Joubert, S. van Aardt, A. A. Persse, Jas. Woodin, J. D. Bothwick (Chief Vet. Surgeon), F. D. MacDermott (editor, *Cape Agricultural Journal*). O.R.C.: Messrs. W. Ehrlich, M.L.A., W. C. Whittal, H. Ibbotson, C. McG. Johnston, W. J. Palmer (Director of Agriculture), E. J. McMillan (Assistant Director of Agriculture), and W. B. Fowler. Lourenco Marques: Mr. O. W. Barrett. Transvaal: Messrs. Isaak v. Alphen, W. M. Struben, W. H. Poultney, W. Harvey, A. G. Robertson, H. A. Bailey, E. W. Hunt, J. T. Bantjes, R. Pape, B. Stilling Anderson, J. J. Pienaar, L. J. Hutch, and D. Gunn.

The President introduced the Commissioner of Public Works and Lands (the Hon. C. H. Wessels), who opened the proceedings.

The Hon. Mr. Wessels said it gave him, as representing the Government, great pleasure to welcome them in the capital of the O.R.C.—he almost said the capital of South Africa. (Laughter.) He was, however, afraid of offending some of them. (Laughter.) The Government were delighted to see men representing agriculture in South Africa gathered here in Bloemfontein. They were aware that the agricultural and pastoral pursuits were the backbone of South Africa. The Government would follow their discussions with the greatest interest, and they would try to give effect to their resolutions. When the minerals of the country were played out they would have to fall back on agriculture. Referring to the wool industry he said that South Africa would shortly be able to produce wool which could compete with Australia and other lands. He also dealt with the ostrich industry, and he spoke of the necessity for improving their breeds of cattle, not only for slaughter purposes, but for the dairy. He next dealt with the desirability of producing a class of horse which would be suitable for military purposes. They should encourage the Governments of South Africa to go in more for irrigation works and so save the precious fluid which ran to the sea. The Governments should develop as many irrigation schemes as possible. He doubted whether it was a wise policy to export all their mealies which could be used in this country. He thought they should rather feed their stock and poultry with those mealies. In concluding, he again expressed his pleasure at being able to open the proceedings.

The Rev. Jas. Scott (Natal), in moving a vote of thanks to Mr. Wessels, said he also doubted the wisdom of sending their mealies out of the country to fetch 8s. a muid instead of feeding their stock therewith.

The Hon. Mr. Wessels, in acknowledging the vote, said he hoped the meeting would be a successful and an instructive one.

The President's Address.

The President, Mr. C. G. Lee (Cape Colony) in opening the Conference proceedings, said:—Gentlemen,—I must first of all most heartily welcome all here assembled to the work of the Fourth Annual Congress of the Inter-Colonial Agricultural Union. You have come here at considerable personal sacrifice, and it may be taken as a hopeful sign for the future of this country that there are so many interested in the affairs of the land who are prepared at a time like the present to set aside their other business and attend a meeting such as this. It needs a certain amount of enthusiasm to do this when the clouds of depression still hang about us. I think we may also specially welcome the representatives of the various Governments who are present, as their attendance is a guarantee that in spite of the hard times agriculture is not losing its importance with those who have the ordering of our public affairs. The agricultural organisations of South Africa need a little encouragement and sympathy just now for they have been faced by several severe set-backs. These have arisen in several ways, and among the many causes may be mentioned the following: First a lack of interest, which has brought about a feeling amounting almost to indifference in some cases. This in turn is traceable to another idea which seems to have grown up, that when we get Closer Union the new form of Government will be sufficiently powerful and wealthy to do anything and everything. Secondly, the depression has compelled Governments to retrench their efforts in supporting agricultural societies, and in other ways contributed to a feeling of uncertainty as to the future. And thirdly, the continuous formation of new organisations to represent some form or phase of agriculture during the past decade has led to a certain amount of reaction in that direction. Organisation is very necessary for every class of the community, more particularly one with so many and diverse interests as the farming classes. But this sort of thing can be overdone. If the farmer wishes to attend properly to his business, the time at his disposal for attending meetings is necessarily limited. It is, therefore, becoming more evident almost daily that a great need exists in South Africa for a sound and scientific system of organisation for the farming industries. It may not be within the province of this body to tackle a question of such magnitude and importance, but I feel that no harm can be done by calling attention to the waste of time and energy which goes on at present. With the increasing demand on the time of our leading farmers, I feel convinced that it will be found imperative before very long to adopt measures of protection that will include a general economy of time and effort, the concentration of our forces, and prevent the wasteful diffusion of energies which now predominates. I am among those who firmly believe that the Colonies cannot afford to dispense with any of their recognised agricultural and farming institutions, but I am just as fully convinced that by bringing these organisations together and uniting their forces the value of their joint efforts would be vastly superior to anything ever attained by the system now in vogue. It may be considered superfluous at a gathering of this nature to start preaching the doctrine of unity and the need for organisation in agriculture, and I admit it is, in a sense, for this body has always stood for the general interest and the common good. But if it is looked at properly, it will be seen that this gathering is just the centre from which such principles can the more forcibly radiate. This Union speaks with

a voice which is heard with respect throughout the length and breadth of South Africa, so it becomes the duty of us all to never miss an opportunity of advancing those great principles upon which this organisation is based, namely, equality and unity for all represented in its councils. We have the widest of fields for the exercise of our activities and a very large audience; it should be ours therefore to spread abroad so far as we possibly can the truths which we know make for the betterment of the communities we represent. These things are doubtless well known, but they need to be repeated again and again in order to prevent them from slipping from the memories of our brother farmers who are allowing their farming organisations to lapse for the want of a little forethought.

THE NECESSITY OF ORGANISATION.

I trust no one supposes from what I have said that I have any fears as to the future of this Union, because if they think so they are seriously mistaken. I feel, on the contrary, that this Union must be maintained, as the need for its continued existence becomes more generally recognised the longer we maintain it. And the good work which lies before it is practically unlimited. For instance, it should prove a powerful factor in maintaining the white man on the land against the increasing competition of the native cultivator. And not only keeping those on the land who are there now, but by gradually increasing their numbers and encouraging the gradual adoption of more advanced methods to so popularise farming in this country as to make it the principle occupation of the unborn millions we hope to follow us. It has been stated, and with some show of justification, that the time will come when the European of this country will be seriously taxed to hold his own against the increasing competition of the native producer. I am compelled to admit that in some few instances this has actually happened, but for all that I cannot admit that it is ever likely to become a really serious problem for the bulk of our people. In point of fact, I am with those who conscientiously feel that such a state of things must not be allowed to arise, because there is room enough in South Africa for a white and black population so numerous as to dwarf into insignificance the present number of its inhabitants. In other words, room must be made for all, and it is in this direction that the efforts of a body such as ours must be directed if we are to justify our existence. Some of our farmers, more particularly those of the old school, are already beginning to feel a little cramped owing to the gradual filling up of the available farming lands. But if the matter is looked at fairly and squarely, it will be seen that this cramped feeling is not due so much to any very large increase of the agricultural population as to the methods which have hitherto obtained in cultivating the soil. The "old school" has had its day, and served its purpose; it will now have to give way to more modern and advancing systems. The earlier pioneers of agriculture in South Africa practised much that will never be out-of-date, because it was based on sound principles, but the generations as they arise must always be prepared to advance with the times and adapt themselves to the conditions in which they find themselves. They cannot stand still and justify their apathy by quoting the methods of those who have gone before; they must do as their forebears did and bring their methods into line with the requirements of their day. It is in such work as this that our Union can render most valuable service to this country. We shall always, I hope, proclaim aloud the pressing danger of the country tolerating the existence of plagues in its midst which put to the blush the afflictions of the ancient Egyptians, without making an effort to get them under control. We shall always, I hope, denounce the evils of over-stocking our pasture lands, the neglect of the application of manure to exhausted lands, the lack of forethought and energy which allows the

flood waters of the drier districts to rush away to the sea while the lands and stock perish of drought. It is in these and the general neglect, not to say contempt, of advanced methods of farming, where the real danger lies for the white man in South Africa, not in the possibility of real competition from the native cultivator. It has to be admitted that the natives wants are fewer than ours, and as a consequence he may become a competitor for the Home markets in some lines, but the European has the great advantage of many generations of enlightenment behind him, and if he maintains this advantage, there can be very little to fear. No sane person could advocate a policy of keeping the native back, it is for the European to see that he maintains his own lead.

Education and Agriculture.

This subject naturally leads one to that of education, for it is education, and more particularly scientific agricultural education, which has to be looked to if the position of the European is to be maintained and strengthened against the possible competition of the native farmer. It is with the future generations that we must deal, and we can only do that by seeing that every facility is given to them to fit themselves for the responsibilities that will fall to them and arm them to face any competition, whether from white or black, with the assurance born of knowledge. The educationists and the schoolmen may be at first inclined to resent the intervention of the "men of the plough," in what they may consider as their own particular domain. We may be at first a little awkward in approaching these great subjects, but we must not be discouraged. It is our duty to do all we possibly can to forward the best interests of our people and those who will follow us. We may not have the literary ability of those who have the control of education at the present time. Our learning is gleaned from the great Book of Nature, the fountain of all true knowledge, and it is ours to see that a love of the great truths which are there for all to read may be instilled into the rising generation. We should offer no criticism of existing methods; we should rather endeavour to graft on to the present system a new branch which our experience teaches us will bring forth fruit a hundred fold. The beginnings may be small, but they must be maintained. There is very little in the educational methods practised in this country to encourage a love of country life, or to instil into the growing youth anything approaching a true appreciation of the real pleasures to be obtained by the intelligent, well educated man who devotes his energies to farming. These are the points we should insistently and consistently advocate, until from small beginnings they form the most important part of the elementary education of our youth. What could be made more interesting to a boy or a girl than a few simple truths as to the wonders of plant growth, and the marvellous miracles which are enacted day by day in the soil at their feet. Yet these find no place in a modern education. And thus it goes on year after year, while the country is crying aloud for men and women of brains and energy to develop its enormous possibilities, we are turning out generations with no knowledge of the elements upon which the whole future of the country depends. Therefore I maintain that this Union and every organisation interested in agriculture in South Africa should look to this as one of the most important labours within the sphere of their influence. We must not, as I said before, begin by blaming anyone. We are as much to blame as anyone else. Our part is to help as far as possible in righting what I conceive to be a great wrong to the whole of our people, for this is a national question of the greatest importance. We who have the knowledge, even though we may only have a crude conception of all it means, must bravely face our duty and never rest until the system of education—I had almost said wasteful system—is modified and

amended. Farming is becoming more fashionable, if I may use the phrase, than it used to be, and the danger now is that many will rush in with neither the knowledge nor the natural gifts which make a sound farmer, and thus more harm may be done. But if we start now and educate the tastes and ideas of the younger generation, in time they will be able to judge for themselves why certain farmers fail and others succeed. Beside that, the great want of the country is production; we are taking our place in the markets of the world, and we shall need all the brains and energy we can command in the future to hold our own there.

Fodder and the Future.

The period which has elapsed since our last Conference has shown us much that is of the greatest interest to this country. The past year has shown that South Africa can produce cereals at a profit for export. We have shipped away mealies and oats which have sold readily at good prices in the great markets of the world. In the case of mealies, I doubt if it was realised before that we have a soil and climate second to none in the world for the production of this most useful and valuable crop. And it is not only with these crops that a revelation has been given, but almost the same has happened with our lucerne for home consumption. Lucerne is now shown to be not only one of the main factors in the production of valuable ostrich feathers, but it has been proved to be almost invaluable in all branches of our farming. By its means many thousands of head of stock have been kept alive during severe drought which would otherwise have died of starvation, while more thousands have been fattened which would otherwise have made very poor butchers' meat. Yet we are only on the fringe, as it were, of the possibilities which this grand fodder contains for this country. People were slow to take it up because of much misapprehension and want of knowledge as to its real merits, but with mealies and lucerne we may claim that we have the most perfect feed for stock in the world. In addition to these, I hope to see another fodder plant introduced for the drier districts. The thornless cactus, which is now being introduced into other parts of the world, is worthy of a trial in South Africa, more particularly in our semi-arid pasture lands, for the "Spineless Opuntia" comes very near the ideal plant we have been looking for in those parts. There is, naturally, a little uneasiness among the more conservative people who have spent large sums in the eradication of prickly pear at the prospect of any other plant of the same family being brought in, for fear it should prove as great a pest as that which they have taken such pains to get rid of. Their objections are based on the belief that no matter how bare of thorns this cactus may be when brought here, it will soon develop its natural armament, and then the work of eradication will have to begin all over again. Yet all must agree that such a plant would be an almost priceless boon to our vast tracts of arid land if it could be propagated minus thorns. These plants produce a large quantity of juicy succulent food, and will grow in the most inhospitable conditions, with little or no rain. A crop from such plants would make the lucerne hay go twice as far for feeding purposes, and stock would do better on such a mixed ration than on lucerne hay alone. This plant has been produced, thanks to the energy and perseverance of Mr. Luther Burbank, the great American plant specialist, and I trust it will not take so long to get its merits recognised as it has taken to get people to realise the full value of lucerne. Give the country such an addition to its mealies and lucerne, and we should not only have little to fear from drought, but would soon develop into a great stock-raising country second to none. Did time permit, I could give some facts regarding the results of feeding stock on mealies, lucerne, and

prickly pear during a serious drought, which lead me to believe this feed to be an almost ideal ration.

THE GENERAL ADVANCE.

It is very gratifying to be able to note that all branches of farming seem at last to be on the advance in South Africa. One can go from farm to farm, and from district to district, and everywhere the signs are prominent of the breaking of the dawn of the new era. The change is coming slowly, but it is there all the same, and the movement is advancing so steadily that there is really no time for resting, there is so much to be done. Our Union must, therefore, participate in the general awakening. It is pitiable to see the thousands leaving our shores, and much of this might have been prevented had the land of the country been in a more advanced state of development. Many of those who have gone might not be able to make a living off the land had they the chance, but an appreciable number might have done so had they been given the opportunity. In that case the balance might have been provided for in other ways through the prosperity which would have accrued from the increase of industry which always arises from agricultural production. This lack of development of our agricultural and pastoral lands is one of the great drawbacks of this country, and we should look to it that the existing state of things is remedied, otherwise however shall we be able to build up the nation we all hope to see. The other young nations of the world are all growing strong by getting people upon the land, and we shall have to follow suit. It is not to the interest of farmers to see people leaving a country, and this Union should seriously consider this question of emigration as one that intimately concerns themselves. Let the farmers ask themselves which is most likely to conduce to the welfare of the community, the driving of people away or inviting the desirable ones to share with us the good things South Africa is blessed with, so long as the new-comers are willing to subscribe to our national ideals. There will be no lack of new-comers if the land is developed and fitted to carry them.

EAST COAST FEVER.

I cannot conclude without a word or two upon the sympathy which is felt throughout South Africa for the alarming loss suffered by Natal through the ravages of East Coast Fever. But the people of Natal need more than sympathy, and it is hoped that in the discussions at this Congress something practical may be evolved which may help them. They fully deserve all we can offer for their uncomplaining bravery in so terrible a crisis. This disease has been most carefully watched in the Transvaal, and the Cape so far has managed to keep it outside her borders. All will be proud of the marked success attained by the Transvaal in getting it under control. In Rhodesia, too, success has been met with, and the people there, though they suffered heavy losses, were not discouraged, and are now busy re-stocking. Assuredly South Africa is a hard country, but its people seem never to lack courage and faith in the future, one of the most valuable assets any people can possess. They always seem to come up smiling, and such faith and courage must have its reward. Maintain this spirit, and nothing should keep us back from the goal I believe we are all aiming at, greater industry and Closer Union. I will not detain you any longer, as you have gathered here for the purpose of making the best possible use of your valuable time. I feel that your deliberations will be carried out with the good feeling and moderation which has always characterised these gatherings, and my sincere wish is that your discussions will bear the fruit they deserve, and result in lasting good for our country and people.

The business of the Congress then proceeded.

RAISIN MAKING.

By I. Tribolet, Viticulturist, Elsenberg Agricultural College.

To make a good raisin, a good grape of the right variety must be grown. For the very best they should be grown on fairly light, rich alluvial soil. A perfect raisin is not obtained from heavy, strong, dry soils. The best variety for raisin-making is a Muscat. Nine-tenths of the Lexias and Malagas of commerce are made in North Africa from "Muscat of Alexandria." In Spain, California, Australia, from Gordo Blanco, and in South Africa (Cape Colony) from Hanepoot.

These three grapes if not identical are so closely allied as to be for all practical purposes the same, and any slight variations that may be apparent between the grapes grown in these different countries are considered to be due to slight changes that have taken place in the plant through being submitted to different modes of treatment, being grown on different soils and under different climatic influences for a number of years.

The product of this vine is divided into two great classes of raisins known as: -

(1st) Pudding raisins, loose raisins, Lexias (dipped grapes).

(2nd) "Malagas," "Layers," "Clusters," "Table raisins" (undipped grapes).

On account of the greater quantities of Lexias made in this country, I shall deal with them first. As a fine grape and complete maturity are necessary for a high grade raisin, low vines, but high enough to keep the fruit off the ground, and short pruning with from 7 to 9 spurs for a full-grown vine is the most approved manner of treating the plant. When the grape is fully ripe, having at least 25 per cent. of sugar, it is carefully gathered; hard, sunscalded, rotten, broken and diseased berries should be removed from the bunches, which are then submitted to a dipping in a lye variously made up of quantities of the ash either of certain slightly aromatic plants or of the ash of vine-cuttings and water, caustic soda or concentrated trade lye sold under different marks also mixed with water. The first method of preparing the lye with ashes is of some antiquity, as Columelle, something like 2,000 years ago, gives an almost exact description of the present day method. He says: "You must heat in a boiler or big pot a lye prepared by dissolving the ashes of vine-cuttings in water, when boiling, pour in a little olive oil of the best quality, and mix; then immerse for a few seconds several bunches of grapes tied together, long enough for them to change colour, but not to cook."

The following is a present day formula as used in Smyrna, given by M. Léon, Director of Agriculture at Constantinople:—

Ashes of oak or vine-cuttings	50 lbs.
Olive oil	1 bottle.
Water	25 galls.

The following is the method of preparing the lye in Tunis, from Messrs. Minangoins and Corston's report on "Les Raisins sec en Tunisie," published by the Government for the information of their raisin farmers: "Put 22 gallons of water in a boiler; when heated to near boiling point

mix in 32 lbs. of sifted ashes of vine-cuttings; bring to a boil and stir for a few minutes, then pour the whole mass into a tub or cask with the end out. The following day after settling, draw off the clear liquid and throw away the sediment. It is the clear liquid that is used as the dip." The amount necessary for the whole season is usually prepared before starting dipping operations. In this Colony the ash of a bush called "Ganna-bosh" is a good deal used by raisin farmers. The amount used varies as each farmer seems to go by "eye measurement" founded on whatever previous experience he may have had in the treatment of his grapes. Something may be said in favour of the treatment of grapes with an ash lye, especially is it safer when the mixture is made by "eye measurement" or in a slipshod manner, as the alkalinity of the ash, which contains potassium, soda, magnin, etc., is not so great as that of the caustic soda, and the risk of overdoing it therefore less. It is said that the grapes treated by "Ganna" weigh heavier than those treated with soda, take longer to dry, and are of a darker colour. The two latter points certainly not being in favour of the "Ganna ash" If investigated, however, I think the difference would be found to be possibly due to a matter of insufficient ash in the lye, or the water not kept about the boil. In the second case where Greenbank's lye or caustic soda is used, it takes about 1 lb. of the former to 10 gallons of water and 1 lb. of the latter to 8 gallons of water.

The strength required varies, and must be regulated according to the class of grapes with which you are dealing; if grown well in the shade of the leaves, the skin will be much thinner than if exposed to the sun. The test of the work being done properly is the number and minuteness of the little cracks or checks that are found principally about the stalk (pedicil) of the berry. Whether dipping with ash or with lye, one point of importance must be observed and that is that the water be kept as near boiling as possible, then two or three seconds immersion is sufficient. Before dipping in the lye it is an excellent plan to plunge the grapes two or three times into clean cold water to wash off any loose grit or dirt that may be attached to the berries, this helps to keep your alkali dip clean for a longer period than if you neglected this preliminary washing, although after a while, on account of the water carried into your lye, it will require grading up now and then with a little more ash or caustic soda.

The object of dipping into a hot alkaline liquid is to cleanse the grape and cause it to dry much quicker. The alkalinity and heat of the boiling lye both act on the grape. The caustic nature of the liquid dissolves the waxy bloom, which forms a protective covering on the grape, causes a breaking up of the cells of the skin, and allows the water of the pulp, when heated by the sun, to evaporate more readily. The action of the heat causes the watery pulp of the berry to expand suddenly, and bursts the skin in a number of places. The cracks formed when very fine and numerous are a proof that the lye is of the right strength and heat, and that the grapes have not been immersed too long. The opposite holds if the cracks are few and big and the skin peels back from the pulp. As has been stated, an addition of olive oil to the lye is sometimes made, whether an advantage or not is still a debatable point. It is a universal practice in Asia Minor, whilst it is not practised in Spain. Professor Eissen, in "The Raisin Industry," says:—"It is not likely that the use of oil in this connection will become popular in California until it has been plainly demonstrated that not only does it improve the raisin, but that it also commands a correspondingly higher price. Those who wish to experiment in the matter cannot do better than adopt the formula used in Smyrna."

In Spain, lavender, rosemary, and similar aromatic plants are put to boil with the lye, which gives a distinctive flavour to the raisins. Many of our native plants might be used for the same purpose.

To give the raisins a fine golden colour, the dried twigs of a species of Artemesia (*Artemesia herba alba*) are added to the boiling lye. Whilst the washing of the grapes before dipping is an undoubted benefit. A washing in fresh water after the dipping might also be of benefit, as the alkali that remains on the grape sometimes gives it a stickiness and flavour that are rather objectionable. By washing after dipping, a raisin with a skin perfectly dry and free from stickiness might be obtained, points that are highly appreciated by buyers. It is at any rate well worth trying.

Dipping Apparatus.

All that is required is a suitable vessel in which to boil the lye, set in a convenient place and masoned in to prevent loss of heat, a few dipping trays made either of tinned or galvanised wire netting or some other device to hold ten to twenty pounds of grapes, the handle so fixed that it falls completely over on either side or quite makes the circuit of the vessel so as not to interfere with either the filling or the emptying of the tray. Before commencing to dip a lot of grapes, the lye should always be tested with a few bunches and corrected if necessary. Dipping should take place as soon as possible after the grapes are cut. Never leave them over till next day.

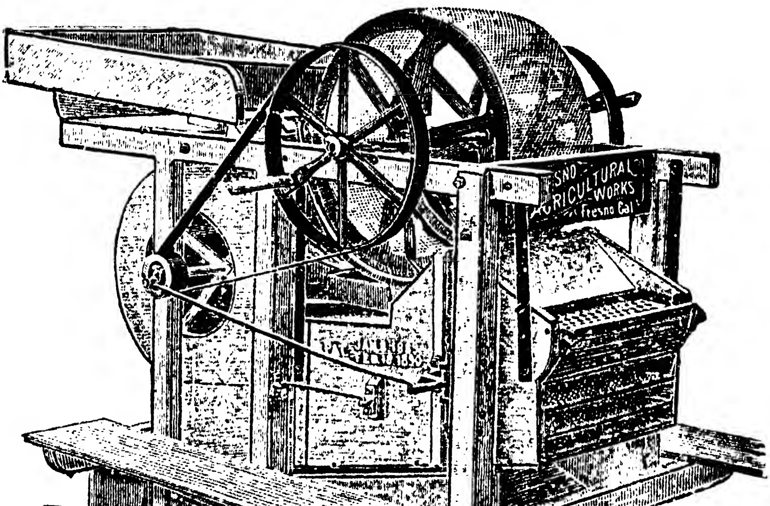
Drying the Grapes.

After the grapes have been dipped in the lye and the surplus water allowed to drain off, they are immediately placed on trays and carried to the drying ground which should be near at hand. The trays are usually made of light wood and are of two sizes, the smaller 2 feet by 3 feet, the larger 3 feet by 6 feet. The former are made of boards, ⅓ inch thick, nailed to two end cleats 1 inch thick and 2½ inches wide, a strip of light wood 1½ inches wide may be nailed to join the two cleats together—such a tray is useful for any fruit drying in the sun and can also be used for storing oranges or lemons by placing them in sweat boxes packed on top of each other with a layer of fruit on each tray. The larger trays are made of slightly heavier wood. In the event of rain or heavy dews, the trays laden with grapes can be stacked on top of each other without injuring the fruit and an empty tray or two put on top, a sack or few bags hung down the sides to keep off the rain.

The Drying Ground.

A site should be selected that is well exposed to the sun and protected as much as possible from the winds, away from a high road or any place where dust is likely to be raised and blown on to the drying ground. The surface of the ground should be watered and rolled or beaten down till it becomes hard and free from dust, and is easily kept clean. A grassy sward cut short makes a clean drying ground, but the grapes take one or two days longer to finish than if the trays are put on bare ground. On this drying ground the trays, covered with a single layer of grapes, are placed in rows end to end, a narrow passage being left between each row of trays. The trays are resting on the two end chests, thus leaving a space of 2½ inches between the bottom of the tray and the ground, through which a current of air passes. After two or three days the side of the bunch exposed to the sun is nearly dry and assumes a deep chestnut colour, whilst the berries of the under side of the bunch are still

plump and juicy and retain their clear colour. It is now time to turn the grapes, which is usually done by placing an empty tray on top of the grapes, pressing it down and smartly turning the underneath tray on top and the top one underneath. The upper tray is then removed and the undried berries left exposed to the sun. Two or three days after turning, in good weather, the whole bunch should be sufficiently dry. About the end of the drying period the grapes should be carefully watched to see that they do not dry out too much. When the grapes are quite converted into raisins they still contain about 20 per cent. of moisture. If a few of the average berries are taken and squeezed between the fingers and no moisture exudes, it is a sign that they are dry enough. A good quality raisin should have a fleshy, firm, and slightly crisp pulp with a skin that



The North Porteous Hand Power Raisin Mill. Price, f.o.b. Fresno, Cal. U.S.A., $25 dols.

has retained its suppleness. If over-dried, the value of the raisin is considerably lessened, and there is also considerable loss of weight. Five to eight days, according to weather, ought to be quite sufficient to produce a thoroughly dried raisin.

Stemming and Grading.

As soon as the raisins are dry enough they should be stemmed and graded. If left lying for any length of time the stems become tough and hard to separate from the berries. The stemming is sometimes done by working the bunches in a sieve or over a screen and throwing them up in the air and allowing the wind to blow the stalks and lighter particles away. The quickest and most effective method is to put them through the stemmer or, better still, through the stemmer and grader. These machines rub the stalks off and blow them away, acting somewhat on the principle of the ordinary grain winnower, at the same time delivering

the raisins into boxes, separating them into three or four grades as may be required.

There are different sizes and makes of these machines, ranging from those driven by hand that stem and grade a few hundred pounds of raisins per hour, to those that put through six, eight, or more tons per hour.

The illustration is of a very handy machine which would be suitable for a fair-sized raisin farm. It is driven either by hand or by power; if by hand it requires two men, and stems and grades into four qualities about 500 lbs. of raisins per hour. A larger machine known as the "End Shake Porteous Raisin Mill," of which there are two sizes one doing 1 ton per hour and the other 2½ tons, is on the market. Prices, £45 and £70 respectively in California. The former takes a 2 horse power engine to drive it, and the latter a 6 horse power. These larger machines would be suitable for a small society of farmers or a small packing house. The largest size mentioned, 6 to 8 tons per hour, costs from £140 to £150, and requires a 10 horse power engine. After stemming, the raisins are either placed in sweat boxes or in heaps in a close room on a clean floor for 10 days or longer to undergo a sweating process. If on the floor they are turned over a few times with a wooden shovel, and if in sweat boxes they are changed into other boxes two or three times during the sweating period. This tends to give them uniformity of texture and dryness. The sweat boxes are made slightly longer and broader than the trays and about 8 inches deep; hold 120 lbs. of raisins. When the sweating process is finished and they are nicely evened up, they may be packed according to grade in parcels of size and get-up most suitable for the trade.

Malaga Raisins.

Also known as "Clusters," "Stalk," or "Undipped Raisins." The grape mostly used is the Gordo Blanco (Hanepoot), and the treatment of the vine in the matter of cultivation, pruning, etc., the same as for pudding raisins. Malagas require more careful handling than Lexias, take longer to dry, and should only be made of the finest and most perfect bunches of the crop. A Lexia takes from five to eight days to dry, whereas a Malaga will take from two to three weeks; the reason being that the Lexia has been dipped in boiling lye, which causes the skin to crack in numerous places and thus allow the juice of the grape to dry out more rapidly. The Malaga has been untreated as far as dipping is concerned, and the waxy covering holding the bloom is intact and the skin of the berry unbroken.

When the grapes are thoroughly ripe they are carefully gathered. The berries themselves should not be touched with the fingers, as this destroys the bloom. It is important that it should be retained as it adds considerably to the value of the finished product. The usual method of procedure is to take the bunch by the stalk and with a sharp knife cut it off as close as possible to the cane that bears it. The bunch, still only handled by the stalk, is gently laid in a shallow basket or tray in which only one layer is put. In some cases they are left to dry for a few days in the vineyard on trays placed between the rows or in the roadways or headlands, but the most usual practice is to cart them direct to the drying ground, where they are placed on trays, after all broken, deformed, small, or otherwise inferior berries are carefully snipped out. The bunches when being cut should be sorted into two, if not three grades. This is done by the picker in the vineyard. He usually has three baskets by him, the shallow one for the first grade, in which only one layer is put, and consists of the most perfect and largest bunches; the other two baskets may be deeper and contain two grades of smaller bunches. It

is an advantage to have bunches of about the same size on trays when drying, as each tray dries out more evenly than if large and small bunches were mixed on the one tray. The small bunches dry sooner than the large. As washing the bunches before putting on the trays would destroy the bloom, when practicable they are submitted to a powerful air blast which blows off all dust, particles of dirt, cobwebs, dried bits of leaf, etc. After being exposed to the sun for a week or ten days, the upper half of the bunch will be sufficiently dry for turning; if on the ordinary tray this is done as described in treating pudding raisins. In the Malaga District of Spain, where the raisins are dried on prepared beds, the turning is done with long-handled wooden tongs, each bunch being carefully lifted by the stalk, turned, and set down again. In from five to seven days after turning, the grapes should be fit to take in. The exact moment can only be determined from experience gained by a certain amount of practice; as a rule it is better to take in a little under dry than over dry.

Care must be taken that the crop whilst on the drying ground is not exposed to rain and heavy dews, as one wetting will lower the price by fully half. The usual thing, if there is no shed or covering provided, is to stack the trays one on top of the other, cover with a few empty trays, and a sail or something of the sort. A point of some importance that I might perhaps have mentioned before, is to change the situation of the trays; that is to turn the trays round, the end facing the south round to the north, and vice versa. It will be found that the drying will be more even, and also more rapid, a day or two sometimes being gained, as the whole of the grapes will have been exposed to the sun's rays at the same angle. This should be done at least once—better twice. After deciding that the grapes are dry enough to take in, a good plan is to stack the trays the evening before and during the early part of the morning, whilst there is a slight amount of moisture on them from the night air, pack them carefully in single layers in sweat boxes with a sheet of coarse Manilla paper between each layer. The slight moisture keeps them pliable, and the paper prevents the interlocking and tangling of the bunches when being taken out for the final packing. The sweat boxes when full are stacked one on top of the other in a room that can be made air-tight and dark, as well as means being provided for ventilation if necessary. They are allowed to remain there and sweat for 10 to 20 days, after which they may be packed in parcels suited to the style of trade for which you are catering.

The grades for the British trade are usually in the descending order of quality as follows:—

	Price per 22lb. Box.
Extra Imperial Clusters (7 Crown)	96/- to 120/-
Imperial Clusters (5 Crown)	89/6
Royal „ (4 „)	44/10
Choice „ (2 „)	38/5
Best Layers (1 „)	30/5
Ordinary Layers	25/7

Quoting the prices of genuine Malaga given in "Les Raisins sec de Tunisie" for season 1905. It will be found that they vary considerably, running from a little over a shilling to 5s. 6d. per lb.

The finished Malaga should be of a deep violet colour, toned down by the bloom on the berry. The skin supple but fairly tough, the flesh firm and slightly crisp. The surface of the berries dry, smooth, shining, and not having the slightest sign of viscosity or stickiness. It takes about three pounds of grapes to make one pound of raisins.

POULTRY ON THE FARM.

A SERIES OF PAPERS SPECIALLY WRITTEN FOR PUBLICATION IN THE "AGRICULTURAL JOURNAL" BY MEMBERS OF THE CAPE TOWN AND WESTERN PROVINCE POULTRY, PIGEON, AND CAGE BIRD SOCIETY.

(Continued from page 597.)

THE SELECTION OF BREEDS.

BY H. J. MORECROFT.

This is a question which needs very careful treatment. In the first place we must remember that to gain the best results we must make certain that the breeds selected are suited to the soil and general climatic conditions of the districts in which we reside. Where the soil is dry, and there is a free range for the fowls, the farmer or cottager can select almost any breed. If, however there is but a small space available the choice of breeds is necessarily restricted. We will, therefore, take each case in turn and endeavour to explain the merits of the breeds most suited to the same.

In the first instance we will take the case of a farmer who has a considerable number of fowls roaming about the homestead, outbuildings, kraals, etc. Probably the number is unknown, being subject to fluctuations due to the table requirements of the farmer and his family, those of the native "boys" and also those of the "muishonds" and other predatory visitors. Both two-legged and four-legged thieves will always be found where the fowls have a free range, but the loss will be reduced to a minimum if the proper amount of attention be paid to the fowls. This attention, regular feeding, and proper housing should not trouble the farmer much, if at all; it should be the province of his wife and daughters. In these days of suffragettes, women's rights, etc. there is a splendid opening for women to avail themselves of their right to look after the farm poultry! They can thus prove to the world in general and their husbands in particular, that they are able and willing to do their share towards the earning of the income and incidentally the paying of the Income and Education Taxes and all the other little blessings with which the bad times and our paternal Government have saddled us.

We will suppose then that the farmer's wife, counting up her fowls, finds that she has about fifty hens and some half dozen cocks and cockerels. Naturally she does not feel like getting rid of the whole lot at one fell swoop, even though she has read columns in our poultry journals about the folly of having any but pure-bred birds. Let me tell her then that

it is not necessary nor is it even desirable that she should do away with her barndoor hens. They are certainly mongrels, but nevertheless they are wonderfully hardy and probably sickness is almost unknown among them.

Now in all probability if several pens of pure-bred birds were purchased (at a "pure-bred" price goes without saying) it is more than likely that sickness would overtake them before they had been many days on the farm. The removal of fowls from one district to another seems to render them susceptible to disease, and in the same way the introduction of these fowls into a flock will often cause an epidemic to break out with more or less fatal results. Possibly it is due to the effects of a long train or cart journey, perhaps it is that the travelling coops were not as good or as clean as they might have been; whatever the reason, the fact remains that such is almost always the result of the establishment of a number of strange birds on a farm.

We will therefore take it that the farmer's wife decides to keep her barndoor hens, but that she will sell (or eat) the cocks, and replace them by pure-bred cocks of a reliable strain. Herein lies the secret of success and also of many a failure. It cannot be too strongly emphasised that the birds purchased must be of a thoroughly reliable strain. So many are led away by the alluring advertisement of the unscrupulous dealer, and it is very seldom that these crafty gentlemen are brought to book, for they generally manage to keep just inside the law in its literal sense. It is safer by far, and cheaper to deal with a man of repute, a man who has built up his reputation and business by fair and honest dealing. From such a man we can be sure of obtaining the best stock, and be assured of a satisfactory return for the money expended.

We now come to the most important point of this article, viz., which breed is best suited for the average South African farmer. This opens up rather a big question, but I am inclined to suggest the adoption of the following or a similar method:—

If the farmer having 50 hens, or thereabouts, desires to improve the laying qualities of his birds then he should purchase two young cocks of any two of the following breeds: Leghorn (Brown for preference), Wyandottes, Houdan, Minorca, Hamburgh or Andalusian.

A good plan would be, say, to purchase 2 Leghorns and 2 Houdans the first year and then the following year dispose of these 4 birds and purchase 2 Minorcas and 2 Hamburghs, which will run with the half-bred pullets. The result of this crossing will be a fine type of cross-bred hens of Mediterranian type, some, however, having the Hamburgh comb and the Houdan top-knot. These hens would be prolific layers, and very fair table birds. The cockerels would of course have to be disposed of either on the farmer's own table or at the market. If on the other hand the farmer wishes to improve his barn-door hens into good table birds he should purchase cockerels of any of the following breeds, namely, Game (more particularly the Indian Game) and Dorking. These two breeds are by far the best for table purposes. The Dorking, often called the English national breed, has never been a success in this country. Whether the climate does not suit it is hard to say, but it is a well-known fact that many pens have been imported and none have thriven. As regards Indian Game, I am able to speak more confidently, for my own experience has been that the introduction of an Indian Game cockerel into the poultry yard has a marvellous result. The chicks turn out strong and active and, growing rapidly, develope into first-class table birds.

Professor Long, a well-known English writer on poultry matters, makes the following remarks on the subject of breeding birds for the table:—"Just as the Shorthorn or Hereford beast of high breeding is

significant of *multum in parvo* and of quality, as compared with the ill-bred cattle of the country, and just as the Southdown, Hampshire, or the Oxford sheep is typical of mutton production upon a high scale, as compared with sheep which have no breed about them, so are Dorkings, the best types of Game, the Indian Game and the Scotch Grey, types of fowl which present the same qualifications, and are therefore adapted to the economical production of meat. In adition to form, however, it is necessary to look for quality; and this is found not only in the above varieties, but in the Flèche, the Crève Cœur, and to some extent in the lately improved Oriental fowl known as the Langshan. By improving selected farmyard stock, commonly known as the barn-door fowl, chickens of great size and excellent form with good quality of flesh, may be produced; form indicating in its very necessary sense the larger proportion of meat upon those parts which it is well known produce meat of the whitest, tenderest, and most succulent quality." Let us suppose then that a reader of these remarks is an owner of mongrel hens. The course he should follow before the next breeding season commences would be to carefully pass them through his hands, to reject all those which are over two years old, or which are unhealthy, undersized or diseased in any way whatever, retaining only the young, large and vigorous birds of good form and fine quality. These should be mated with a first-class Dorking cockerel and their produce reared, the best pullets being selected and mated in the second year with an entirely fresh Dorking cock. The second lot will have largely improved in size, quality and form; and in subsequent years, by continually selecting the best birds for stock and mating with Dorkings or Game-cocks, quality will be assured, and the birds sold for the table will be certain to maintain their position in the market. The great object to strive for is depth of keel in the breast, genuine fullness of bone and a minimum of offal."

It will be seen by the foregoing that the main point insisted on is that the farmer must get rid of all the male birds except the pure-bred stock birds. He must introduce fresh blood from time to time and endeavour to create a fowl of good type whether it be with a view to egg production or for the table. It will not be found a very difficult undertaking, and I am sure the results will be satisfactory beyond expectation.

The farmer recognises that by crossing his ill-bred cows or swine with pedigree stock, he will reap much benefit in the improved progeny. Why then can he not extend his forethought to the more humble but equally profitable fowl? It is not as if he were being asked to experiment in a hitherto unknown field. The plan has been successfully carried out in other countries, England, Ireland, Denmark and America, and nearer home, in the Orange River Colony. Surely what can be done in these countries can be done in the Cape Colony?

Now let us take the case of the cottager or small farmer whose space is restricted and who cannot give his fowls a free range. In this instance it would be best by far for the would-be poultry-keeper to set his face against the barn-door fowl and go in for pure-bred birds only. If egg production is aimed at, then Leghorns, Minorcas, Andalusians and Wyandottes will be found the best breeds. The following is a short description of these breeds:—

Andalusians.—Colour, blue with black lacing, non-sitters and good layers of large white eggs. They are fine hardy birds, bear confinement well, and deserve more popularity than they have hitherto secured.

Leghorns.—A most attractive looking breed, having, like the Andalusians, large upright combs. They are excellent layers practically all the year round, non-sitters, standing confinement very well. There are several different varieties of the Leghorn, the white, brown and black

being the most popular, whilst there are also the buff and the Duckwing or Pile. All these varieties have yellow legs, a distinctive feature of the breed. There is no doubt that Leghorns have proved themselves one of the most successful breeds in South Africa at the present time. Their extraordinary success in the egg-laying competitions held by the Western Province Agricultural Society bears eloquent testimony to their value as a splendid laying breed.

The Minorca.—Another right good breed, very similar to the Leghorn and Andalusian (all belong to the Mediterranean family). They are larger than the Leghorns, non-sitters, thrive in a small run, and lay well, the eggs being large and white shelled. There are both white and black Minorcas, but the latter are best known in this country, and seem to thrive well under any conditions provided they receive fair attention.

The Wyandotte is a "breed of another colour," for it is an American breed, and a very good one too. In this country the Wyandotte has found great favour amongst poultry keepers, a fact due to its splendid economic qualities. In addition to being a first rate layer, the Wyandotte is a fairly good table bird, there being plenty of breast meat of excellent flavour and quality. The hens are good mothers, hardy, and stand confinement in a small run. The eggs are of the popular brown tint, and always command a ready sale.

There are several other breeds which, although not in the front rank as layers, are yet by no means to be despised in this respect, and which possess the qualifications which go to make up good table birds. Of these breeds we may mention the Plymouth Rock, the Orpington, and the Houdan.

The Plymouth Rock has rightly been described as one of the best breeds of "all-round" fowls that exist. There are several varieties, but the Barred is the only one that has become popular in this country. Like the Wyandotte the Rock is an American breed, with the yellow skin and legs that are so popular "over there," but which do not find the same amount of favour here or in Great Britain. As a table bird the Plymouth Rock is capital, as it carries a large amount of flesh of fine flavour and quality. The hens are good sitters, and lay a fair number of brown-shelled eggs. This breed is very hardy, and thrives well whether confined or in a free range.

The Orpington is another good all-round breed which in this country, somehow or other, has not as yet achieved the success that it is entitled to if its merits be taken into consideration. The Buff variety certainly meets with strong support at our big shows, but in the country districts the breed is either not represented at all, or else the birds are of very poor type. A good strain of Orpingtons, Buff or Black, is hard to beat for both laying and table purposes. The hens are good sitters and lay well, the eggs being tinted. They are hardy and thrive well in confinement.

The Houdan is another excellent all-round bird, one of the breeds which has made France famous for her eggs and poultry. They are fairly large and very active birds non-sitters and layers of nice sized white eggs. They are hardy, and thrive in both small runs and free range, provided the locality is dry. As table fowls they have won a great reputation on the French markets, a fact which makes it unnecessary for me to praise them further. The Houdan is a breed that certainly deserves to find support in this country.

I would very much like to see our Government take up the question of the poultry industry more on the lines adopted in the Orange River Colony. I am sure that if it were known that pure-bred cock birds were

obtainable in exchange for barn-doors, many of our farmers would avail themselves of the opportunity of improving their poultry stock. The matter of finding a market for the eggs and poultry could be worked in conjunction with the system of dairy co-operation. The one would help the other, and the increased quantity would be to the advantage of both, for it is a case of "the bigger the consignment the better" when railway charges have to be paid.

THE HOUSING AND FEEDING OF POULTRY.

As Adapted to South African Conditions.

By S. Smith.

Much has been said and written as to the possibilities of the Cape hen as a factor in the agricultural prosperity of the country. Some have condemned her as unprofitable, owing to the climatic conditions being conducive to the rapid spread of certain diseases affecting her species, and also because the cost of maintenance may easily exceed the value of her output It would be an easy matter to dispose of the subject in this way, and blame either the hen or the climate for our failures, but this is not the spirit which will make South Africa the great country she is destined to become, and difficulties are made to be overcome, whilst without them success brings no satisfaction.

Our poultry has not in the past yielded the best possible returns, because it has had little opportunity of so doing, owing to the fact that owners will not adapt their methods to local conditions resulting from the climate, and in no particulars have greater mistakes been made than in the housing and feeding problems. On the one hand we have the man who feeds his birds on unsuitable foods and allows them to find their own accommodation as best they may, and on the other those who crowd them into close stuffy houses, and in the matter of feeding kill them by mistaken kindness.

There are many advocates of what they are pleased to term the "natural method of poultry keeping," and by this they understand that the birds must roost in the trees and find their own living with the exception of a crop full of mealies at night. If they are satisfied with the results obtained by this method, well and good. They will have a flock of hardy, muscular birds, poor layers, and of small size, which have survived in the "struggle for existence." The Jungle Fowl of India, from which our domestic poultry is descended, answers this description fairly well. It is healthy and hardy, and lays its clutch of eggs in the spring, which it incubates itself, and the rest of the year is devoted to foraging for itself and offspring, but it does not follow that it would be a profitable investment. Domestication and artificial selection has produced the "200 egg a year hen," and only upon these lines can her good qualities be retained and improved upon. Nature's laws are inflexible, and permit of no standing still, a race must either progress or retrogress, therefore the "natural method of poultry keeping" simply means retrogression.

In ninety-nine cases out of a hundred disease in poultry is the direct result of improper management in the matter of housing or feeding. If the birds are bred from the healthy stock and given a fair chance, there

will be little need to resort to medicines. In providing housing accommodation, many poultry keepers fail in the matter of ventilation and a lack of cleanliness. Some keep their birds in close stuffy houses where fresh air has no chance of penetrating; whilst others, who admit fresh air, frequently contrive that the birds roost in a direct draught. Both these arrangements are of course wrong, and the direct cause of swollen heads, roup, and other diseases of the breathing apparatus. It is impossible to admit too much fresh air, so long as the birds are not exposed to the weather or draughts, and in the type of house recommended by me, this may easily be avoided, whilst it can be thoroughly cleaned out daily with a minimum amount of trouble. For a breeding pen of from 8 to 10 birds, the following will be found an ideal house in our climate, and after several years' experience with houses built on similar lines, I am quite satisfied that it solves the housing problem. I claim no originality in the matter, it being in most respects a copy from an American plan.

The dimensions are 12 ft. from back to front x 6 ft. wide x 8 ft. 6 ins. high at apex x 6 ft. high at front. The apex of roof is 4 ft. from back of house, whilst the hinges of the door are in a line with the apex, with door opening towards back of house. The whole front of house is of wire netting, with the exception of a 12 in. board nailed lengthwise along the bottom to prevent litter being scratched out. The roof should project about 12 ins. beyond front of house to prevent rain driving in. The interior arrangements are of the simplest. A movable platform the width of house extends about 3 ft. 6 ins. from back, and 2 ft. 6 ins. from floor, and upon this and facing the door the nest box (which should be movable) is stood. Over the rest of the platform, at right angles to the nest box and a few inches higher are suspended the two movable perches. The whole floor space is covered with chaff or other dry litter to a depth of about 4 ins.. and in this all the dry grain is fed, to provide necessary exercise for the birds. The advantages of a house of this description will be readily seen, the excrement may be removed each morning in a few moments. all interior fittings are movable, and can be taken out and thoroughly cleansed at intervals, whilst the litter can be renewed every three or four weeks according to the number of birds kept. Perfect ventilation may be provided by louvres on either side of house immediately under highest point of roof, and by this means the birds will be quite out of any possible draught.

The materials to be used in constructing the house must depend upon their cost on the spot. Wood, galvanised iron, or bricks (either kiln or sun dried) may be used, although the latter would be more difficult to keep free from insect pests. If built of wood, the house should be made in sections, which may be bolted together and the whole of the woodwork, both inside and out, should be given a good coat of "solignum" or other wood-rot preventive, which in addition to increasing the life of the house makes it proof against red mites, ticks, and other insects which do not live entirely upon the bodies of the fowls. This alone will effect a considerable saving in the way of labour and insecticides. Galvanised iron houses, although very durable and probably much cheaper than wood are subject to greater changes of temperature, which is a disadvantage. This may be greatly minimised by adopting the plan of a local fancier, which consists of completely covering the iron roof (almost a flat one, by the way) with flags of turf, taking care of course that the supports are sufficiently strong.

It may be argued that the first cost of a house of this description would be prohibitive to any profit being made out of the fowls. It should be remembered, however, that if properly made, the house will last a number of years, and a 20 per cent. depreciation written off each

year will be easily made up by an increased egg yield from the birds under the improved conditions. In building a poultry house, it is not of course necessary to exactly follow the above details to obtain the best results, but it is I consider advisable to have a good depth from back to front, an open front, ventilators under the highest point of roof, and the perches with droppings board as far back as possible. Care should be taken that all interior fittings are movable, and that they are removed and cleaned at regular intervals. Insect pests increase with alarming rapidity in this climate, as the farmer knows to his cost, and poultry parasites are no exception to the rule, whilst birds infested with them can never be expected to thrive.

Foods and Feeding.

As in the matter of housing poultry, there is also a right and wrong way of feeding them, if disease is to be avoided and good results obtained. The feeding question has been far too much neglected in the past, with the result that the necessary elements for the growth, well-being, and reproduction of our fowls have been either absent altogether, or in insufficient proportions in their food. The dairyman is careful to see that his cows are well provided with foods that will make milk, but the poultry keeper too often neglects to see that his birds have foods that will create eggs. On many farms, I believe it is customary to feed the poultry with a mash of scalded bran in the morning and whole mealies at night, which is something similar to lighting the fire of a steam engine, keeping it well supplied with fuel, and neglecting to put water in the boiler. Carbohydrates and fats, in which mealies are very rich, provide the fuel by which the organs of the body are enabled to perform their proper functions, but if not provided with a sufficiency of the necessary elements upon which to work, they will get clogged, the fuel is not used up and goes towards making the unhealthy internal yellow fat, which is such a noticeable feature in much of our South African poultry. Poultry diseases are not usually inherited, although the tendency towards them may be, and it depends upon the poultry-keeper's management whether his birds are eventually to fall victims to them. Liver disease and its attendant complaints probably account for more deaths in the poultry yards of this country than all the other diseases put together. The reason for this is not far to seek, as one of the functions of the liver is the conversion of the starch contained in the food into a kind of sugar, which is then assimilated by the body. With a food consisting almost entirely of starch and fats, this organ naturally gets clogged and is unable to perform its work when disease intervenes. Our climate is also a factor in the spread of liver disease amongst poultry, as except in some favoured localities the fowls are idle a good part of the day in any shady spot they can find. In a colder climate they will keep at work all day long, and are therefore able to assimilate a larger percentage of carbohydrates. Although this is the case, there are few experienced poultry-keepers of England or America who would care to keep their birds upon a diet of scalded bran and mealies.

In addition to decreasing the proportion of fat producers in our poultry foods, it is advisable to increase the necessity for the birds to work for their living and this is where the scratching shed before mentioned comes in. If all the grain is fed in litter from 4 ins. to 6 ins. deep, and care be taken in mixing the soft food, there need be little fear of liver disease or fatty degeneration.

The hen is a paying quantity only so long as she produces the greatest possible number of eggs in a given period, and her ability to do this depends upon her obtaining a sufficiency of the elements of which eggs are composed, combined with the requisite quantity of heat-producers to provide the power necessary for their manufacture. The chemical composition of a healthy egg is approximately as follows: Water, 68 per cent.; ash, 12 per cent.; protein, 11·5 per cent.; and fat, 8·5 per cent. If the hen is unable to obtain a sufficiency of any of these elements, it naturally follows that the egg yield will decrease. An analysis of mealies (which varies according to the soil upon which the grain is grown) gives the following results: Protein, 10 per cent.; carbohydrates, 70 per cent.; fat or oil, 5 per cent. To arrive at the nutritive value of a food, we must multiply the fat by 2·5; to this add the carbohydrates and divide by the protein, thus: $5 \times 2{\cdot}5 = 12{\cdot}5 + 70 = 82{\cdot}5 - 10 = 8{\cdot}25$. Therefore we find that the feeding value of mealies is, roughly speaking, 1 in 8 or 1 part flesh or egg formers to 8 parts fat and energy producers. According to the English and American experts, the correct proportion for a poultry ration should be not less than 1 in 4 nor more than 1 in 6 to obtain good results.

In quoting the above analysis, it must not be inferred that it is necessary for every poultry-keeper to be a qualified chemist to be able to feed his fowls correctly, but every farmer is aware that some foodstuffs are of a more fattening nature than others, and he can at least feed his fowls accordingly. I do not condemn the use of mealies as a poultry food in this country, but at the same time cannot advocate their use to the exclusion of all other grains and foods. Mealies fed judiciously at the right time will frequently cause fowls to commence laying weeks earlier than they otherwise would, and which I believe may be accounted for by the large percentage of fat or oil contained in this grain, which causes a more rapid development of the egg yolks. The chief difficulty in poultry keeping is to obtain a sufficiently high percentage of protein in the food at a minimum expense, as all foods rich in this element are somewhat expensive. Of the grains, peas are richest in protein, and for laying stock are to be strongly recommended, but must be supplemented by animal food in some form. Fowls at liberty are able to obtain a certain amount of animal food in the form of insects, but in our hot summer weather they do not get far enough away from home to obtain a sufficiency in this way. We must therefore give the birds animal food in some other form. Fresh lean meat is the most effective, but its price is prohibitive; green cut bone and beef scrap are also excellent, but most of our farmers will be able to obtain a first rate animal food at no cost in the form of locusts, which may be dipped in a cauldron of boiling water as soon as collected, and afterwards sun dried. With this food so easily obtainable. I see no reason why eggs cannot be produced in South Africa at as low a cost as in any other country.

It is undoubtedly a fact that the average egg yield per hen in this country is exceedingly low, partly owing to carelessness in the selection of breeding stock, and a total disregard in the past of the value of strain; but even with the present stock, egg production could be very considerably increased if more judgment were used in feeding the fowls. To give a list of poultry foods easily obtainable in Cape Colony, I would recommend that of grains, wheat, and short stout oats should be the main food, with mealies, barley, Kafir-corn, and Buck-wheat for a change, and always fed in litter of some sort, allowing approximately 2 ozs. per bird daily. For the morning mash I would advise a mixture of bran, fine pollard (sharps), with pea meal and beef scrap or dried locusts, allowing about 1 oz. per bird (weighed dry) daily. Plenty of green food

should be obtainable, and care must be taken that the drinking water is perfectly fresh and clean and not exposed to the sun, as this is a fruitful cause of disease. Medicine should not be necessary if sanitary conditions are maintained and Epsom Salts and Douglas's Mixture given in the water occasionally, and a little flowers of sulphur and powdered charcoal in the mash say once a week. Charcoal is strongly to be recommended for poultry, as its use prevents any troubles of the digestive organs. By care in feeding poultry many of the more common diseases may be checked and even cured; for instance, in cases of roup, when the fowl is generally in poor condition, feed more wheat and mealies and less meat, bran, and oats. For cholera, diarrhœa, etc., feed mealies, boiled rice, and other starchy foods, give charcoal and wood ashes, and no bran or meat. For liver disease and fatty degeneration, the former indicated by blue comb and yellow face, and the latter by great weight and inactivity, feed more bran, oats, green food, lean meat, and peas, and less wheat, mealies and potatoes, etc., and give Epsom salts in drinking water two or three times a week. For egg and feather eating increase the supply of animal and green food, also see that birds are well supplied with oyster shell or other material containing lime.

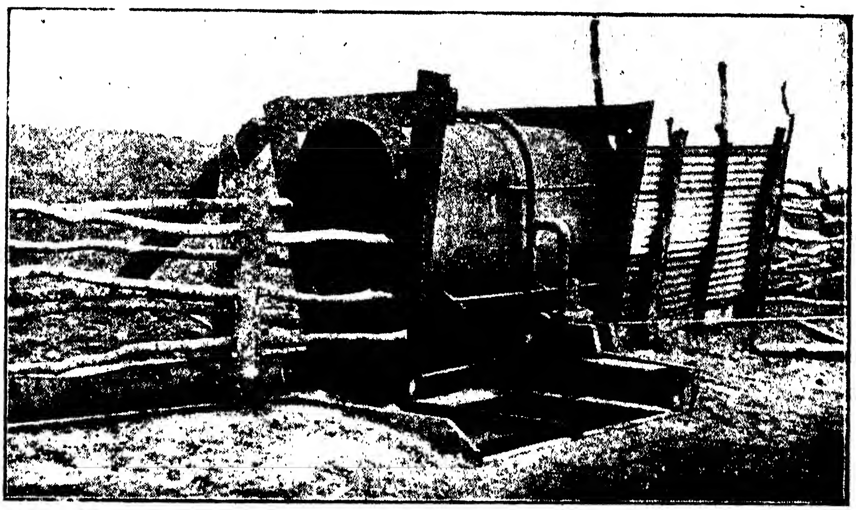
It is impossible to lay down any hard and fast rule as to feeding, as this depends largely upon local conditions and the breed of poultry handled. Some breeds exhibit a greater tendency to over-fatness and liver disease than others, and will require more care in feeding. This applies more especially to the heavy breeds which generally in this climate will take up more exercise than absolutely compelled to in search of food. For this reason I favour the Leghorn as the most suited of any breed for this climate, as its great activity enables it to keep in health under conditions which would be fatal to most breeds. At present the production of eggs is the greatest need here, and prime table birds can follow later if it be found that climatic conditions will permit of their production at a profit. Our egg supply requires regulation not by storing the eggs in bran, chaff, or other material, and placing on the markets in a putrid condition; but by care in breeding only from the best layers, and then feeding egg-forming materials when fowls are unable to find it themselves. Our fowls lay well in the spring of the year because they can balance their own ration with plenty of grubs and green food, and as these fall off so does the egg supply.

THE SEABURY CATTLE SPRAYING MACHINE AT WORK.

EXPERIMENTS AT MESSRS. COOPER'S FARM, GONUBIE PARK, NEAR EAST LONDON.

By W. F. Cooper, B.A., F.C.S., F.Z.S., and H. E. Laws, B.Sc., F.I.C.

A short description of this machine appeared in the September issue of the *Cape Agricultural Journal* by Mr. C. P. Lounsbury, Government Entomologist. In this article, Mr. Lounsbury referred to the fact that one of these machines had been erected at Gonubie Park; and a short note on the working will, therefore, probably be of some interest to your readers.

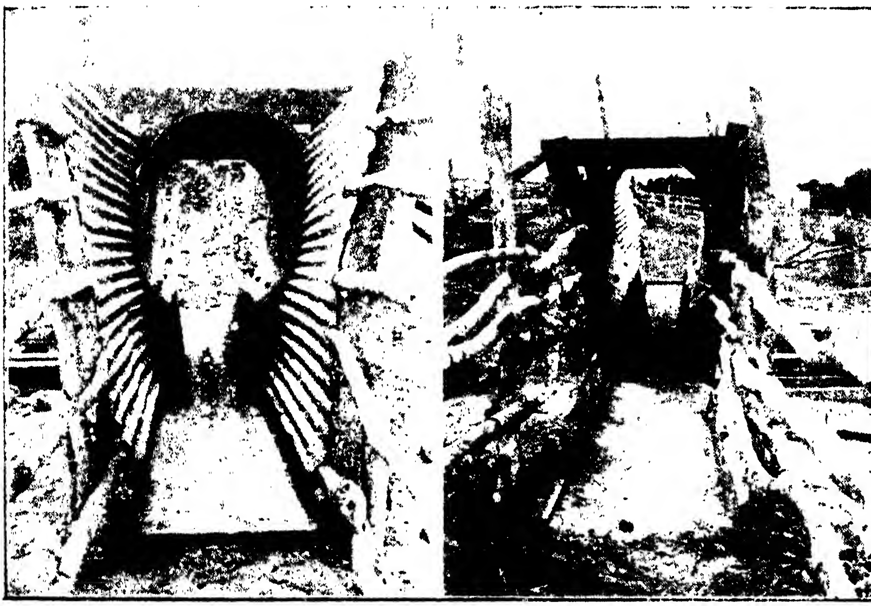


The Seabury Cattle Spraying Machine—Side view showing pumping arrangements.

The machine, as can be seen from the accompanying photographs, consists of a tunnel (9 ft. in length and 6 ft. 4½ ins. in height), which acts as a passage for the cattle; it is constructed of sheet iron sides, bolted together at the top and screwed to a plank floor at the bottom. The tunnel is 14 ins. wide along the floor, which just enables the beast to walk through; it increases gradually in width to the height of 2 ft. 1 in., where its width measures 1 ft. 11 ins.; from this point the tunnel bulges out

considerably on both sides—the upper portion assuming almost a horse-shoe shape when looked at in the end-on position; it measures 3 ft. 3 ins. across its widest part. When once the beast is in the tunnel, it is almost impossible for it to turn owing to the bottom portion, from the floor to the height of 2 ft. 1 in., being so very narrow.

At various heights along the inside of the sides of the tunnel are several series consisting, in all, of twenty terminals of 1 ft. pipes, which are situated in horizontal rows from front to back of the tunnel at the same height on both sides, thus giving the machine a symmetrical appearance. Attached to these terminals are twenty hemispherical screwcaps, which act as nozzles, and through which the spray fluid is pumped. There are also two of these terminals and nozzles in the floor of the machine. These screw-caps, or nozzles, contain no device for converting the fluid into finely divided particles, as do the ordinary well-known nozzles for hand spraying pumps, but they are provided with slits about $\frac{1}{8}$ in. wide,



The Seabury Cattle Spraying Machine—End views.

and varying from the complete arc of the semi-circle to that of a quadrant, according to the position along the side of the tunnel in which the nozzle is placed: the arrangement can easily be seen on referring to the accompanying photographs. The positions of these nozzles are such that when a beast passes through the tunnel it receives the fluid from all directions, those in the floor acting directly upwards, those in the lower parts of the sides acting diagonally upwards, whilst those in the top and upper parts of the sides in the reverse directions. By this device the fluid is supposed to reach every portion of the body of each beast as it passes through.

The spraying fluid is delivered through the nozzles by means of a centrifugal pump, working at 1,200 revolutions per minute, fitted with a $3\frac{1}{4}$ in. suction pipe about 3 ft. 6 ins. to 4 ft. long and $2\frac{3}{4}$ ins. discharge pipe: at the end of the suction pipe there is fitted a suction strainer, which has the effect of preventing any large pieces of solid matter being drawn

into the pump, and thereby interfering with its efficient working. The delivery pipe attached to the pump extends to a height mid-way between the first and second horizontal rows of spray nozzles, where, by means of a 90 degree bend and a "T" piece, it is connected to the main 2 in. pipe, which encircles the middle of the outside of the machine: this method of connecting up the discharge pipe, *i.e.*, by means of the "T," results in the loss of a good deal of the original force with which the fluid is pumped, because it is driven directly against the pipe. At intervals along the main pipe are attached smaller (1 in.) pipes, which extend in horizontal positions along the outside of the tunnels; on to them are connected the short lengths of pipe, which pass through the sides of the tunnel, and to which the nozzles are screwed. Except those small pipes at the end of the horizontal tubes, which are connected by means of elbows, the pipes passing through the sides of the tunnel are connected to the horizontal tubes by means of "T" pieces, thus causing the same loss of power as in the main connection.

A receptacle tank for the spraying fluid is made to such a depth that the suction strainer reaches to within about 3 ins. from the bottom. Almost any tank can be used for this purpose, but the type recommended by the Seabury Co., and that which is at present being used at Gonubie Park, is a concrete cement-lined tank 4 ft. x 7 ft. x 4 ft. about, and 2 ins. below the surface of the ground. This tank extends lengthwise along the tunnel from 6 ins. beyond the suction pipe to 3 ft. beyond the exit end of the tunnel.

The engine driving the pump is a 15 H.P. gasoline, made by the well-known engineering house, Messrs. Fairbanks, Morse and Co. As already mentioned, the pump is driven at 1,200 revolutions per minute, at a maintained pressure of 40 lbs.

When the pump is in action, the fluid is forced through the nozzles at a tremendous rate—at first in the form of a fan-shaped sheet, which afterwards becomes broken up into fine particles by being forced, either against the sides of the tunnel or against one of the outlets from another nozzle.

The tunnel is erected in a sloping position so that the fluid, as it escapes from the nozzles, runs along the floor and back again to the tank. On the top of this tank are fitted three screens of very fine mesh, through which the liquid passes, leaving behind it all solid matter which may have been washed from the cattle, or from the floor of the machine itself.

The engine is usually made to work continuously, and when spraying is being done with a few cattle only this can be accomplished very well with only 200 gallons of fluid in the tank.

On commencing to work the machine, the engine is allowed to run for a few minutes, sufficiently long to warm the water that runs around the cylinder—the machine during this operation being detached from the engine. Then the pump is put into action by means of a friction clutch pulley attached to the fly-wheel of the engine, with the result that, after a few revolutions, the pump runs at full speed, and the machine is then ready for the cattle to pass through.

The kraals for collecting the cattle to be sprayed are constructed in the same way as those for dipping: the most convenient form for experimental purposes being one sufficient in size to contain from 50 to 100 head, the two sides gradually converging until they reach a point about 10 ft. from the entrance of the tunnel, where they are 2 ft. 6 ins. apart; from there they continue in parallel lines towards the tunnel. At the exit, the cattle are made to walk along a sloping concrete race about 60 ft. long, during which period they drain thoroughly, the waste fluid running back into the tank.

Cattle, as a rule, take very kindly to the machine, but, occasionally, a very wild animal causes trouble by trying to turn in the race and to jump on top of the machine; the turning can be avoided by constructing the race not more than 2 ft. 6 ins. wide.

Supplied with the machine is an electro-magnet, the armature of which can be made to revolve by attaching it to the shaft of the pump; this generates a current, of which the E.M.F. reaches about 80 volts when the engine is running at top speed. One end of a wire is fixed to the terminal of the electro-magnet and the other to the point of an insulated rod: this forms an electrical device for urging the cattle into the tunnel. It is only on very rare occasions that we have found it necessary to use this electric prod, and then it had little or no effect upon the beast.

At the entrance to the tunnel, the sheet-iron casing presents sharp edges, which cause some of the cattle, especially those which rush madly through the spray, to knock themselves, thereby temporarily disabling them. This injury can be avoided, or at least minimised, by turning back the sheet-iron casing slightly, or protecting the edges by means of convex strips of sheet iron, or pieces of wood of semi-circular cross-section, thus exposing a smooth edge having no corners.

Cattle were made to pass through while the pump was in action, and immediately they emerged were tethered and examined in every part.

To ascertain the efficiency of the spray, water was put into the tank and pumped through the nozzles.

From the positions of the nozzles in the upper portions of the casing it is obvious that the machine was devised for the more particular purpose of spraying cattle infected with mange and lice, very little attention being paid to ticks, especially Bonts. (This point was referred to by Mr. Lounsbury, who mentions that the apparatus has been developed and widely used in those parts of the United States where there are no ticks, but where the cattle are troubled with scab and lice.) This opinion was confirmed as soon as the cattle were put through—their necks, shoulders, all along their backs and their flanks being thoroughly saturated with water, but not so the lower parts of the animals' bodies. Owing to the failure of the two nozzles in the floor of the machine to emit water with sufficient force to reach the body of the animal (caused by the accumulation of the water flowing along the floor back to the tank), each beast, as it came through, was practically dry at the back of the shoulders, between the hind legs, and under the tail around the anus.

Experiments are now being carried out to ascertain the efficiency of the machine compared with that of the ordinary cattle dipping tank. For this purpose, a variety of dipping fluids are being used to discover the difference in action, if any, on the cattle when this new method of spraying is adopted, as against when the cattle are dipped; but from our experience in its use, up to the present the machine is disappointing. However, we are endeavouring to make such alterations in connection with the positions and numbers of the nozzles, etc., so that the machine can be so modified as to be of practical use to South African cattle farmers residing in tick-infested areas.

If a fluid, applied by means of a spraying machine, will saturate the animals as effectively as dipping, and, if the machine can be made portable, it can be placed in centres to serve whole districts: then it would have the enormous advantage of saving heavy expense, both in the building of baths and in the supplying of such large quantities of dip which are required to fill them.

We hope to have a report upon the results of further experiments ready for publication in the course of the next few weeks.

EXPERIMENTS WITH OSTRICHES.—VIII.

By Professor J. E. Duerden, M.Sc., Ph.D., A.R.C.S., Rhodes University College.

As the ostrich industry is comparatively new, and little scientific investigation has hitherto been devoted to it, there are yet many problems in the management of the bird which call for solution; many questions which can only be satisfactorily settled by combining wide experience and intelligent observation. Moreover, the experiences of different farmers are often so diverse that on many points, apparently simple, no reliable conclusion can yet be reached. The questions presented below are brought forward more with the view of stimulating enquiry than as conclusions to be accepted implicitly.

1. The Time Required for the Growth of Short and Long Feathers.

It is usually held that from the time of quilling to the ripening of the next crop of feathers involves a period of six months, and that two more months are necessary before the quills are ripe and ready for drawing. Under these circumstances, the feather requires only eight months for its complete development. A closer investigation, however, reveals that in practice these periods are only approximate, and that much variation, even to the extent of three or four weeks, may occur between the ripening of one crop and that of the next. As is shown below, the question is one of considerable importance to ostrich farmers, but can only be settled by the accumulation of the experience in different districts and under different conditions.

The actual period required is evidently closely connected with the nutritive condition of the bird, and also with the particular strain. Now that so much more attenton is being given to the high feeding of ostriches, particularly by means of lucerne pasturage, birds as a rule are kept in a better condition than formerly. Growth is usually accelerated by high nutrition, and from one's general experience of animals, it would naturally be expected that a bird in a high state of nutrition would grow and ripen its feathers earlier than a bird in a poor or ordinary condition of nutrition. But this would appear to be by no means the usual experience. When the birds are particularly well fed, many farmers are finding that the plumes and quills actually require a longer period than six and eight months respectively in which to ripen.

If the latter be the case, a brief consideration will show that the longer period is by no means a disadvantage. For the longer growth period implies that the feather itself will probably be of greater length, and in these days a longer feather realises a more than proportionately higher price. No farmer would complain of two or three weeks delay in the ripening of the plumes, if thereby the latter were increased so many inches in length, granting, of course, that the tips were not worn nor the lustre diminished.

A single experience will indicate the nature of the results which may be expected. Among a score of chicks were four individuals two or three weeks younger than the rest. All being artificially fed together, the smaller chicks were at a disadvantage throughout, and failed to make the same progress as the others. Yet their spadonas ripened a week or two in advance of those of the other chicks, but were much smaller both in length and in breadth; in fact, among the chicks as a whole, the longer larger plumes were the last to ripen. The blood receded from the pith of the feather more quickly in the somewhat impoverished chicks than in the individuals which were highly nourished, and in the former the spadonas were short, while in the latter they were long.

An isolated experiment of this kind does not prove much; but if the interpretation placed upon it be correct, it is manifest that the matter is one well worthy of enquiry. It will emphasise the great need, now generally recognised, that birds should be kept in a high nutritive state if it is desired to produce large superior feathers. The present note is written with the purpose of eliciting from ostrich farmers their experience of the length of time required for the growth of long feathers, as compared with the time necessary for the growth of short feathers. Most farmers keep written records of their various operations with birds—times of clipping, quilling, etc.—and it should be an easy matter to furnish such data as would be of great value in the solution of the problem.

It can be easily understood where a bird is in a high condition of nutrition that a rich and full supply of blood is distributed to the growing feathers. In such cases the rich blood supply may recede more slowly from the middle pith or medulla of the feather than where a bird is impoverished or even in ordinary condition. The blood receding less quickly from the nutritive medulla will signify that the feather will continue its growth for a longer period; in other words, *the feather in a highly nourished bird may take longer to ripen, but will be increased in length.*

It should be mentioned that some ostrich farmers of high repute find their feathers are ready for clipping actually at six months, and are ready for quilling at eight months precisely; but others again are just as certain that the times must be extended by two or three weeks, or even more. Something must be allowed for the fact that some farmers clip the plumes earlier than others; but allowing for this, there still seem to be differences in the time during which a feather will continue its growth. It is clear that authentic records from a large number of farmers, with notes as to the condition of the bird during the period, would be of great value in such an enquiry. The question can be stated in several ways: (*a*) *Do long feathers require a longer period than short feathers in which to ripen?* (*b*) *If a bird is highly fed, do its feathers take a longer time to ripen, and thereby give a longer plume?* (*c*) *If a bird is impoverished, we know that its feathers are inferior, and at the same time do they ripen earlier?*

2. Does an Inferior Feather-producing Socket ever Regain its Original Power?

There is scarcely any more encouraging sight to an ostrich farmer than to find every plume in a wing fully and uniformly developed, and an absence of blanks or irregularities of any kind. But all farmers of experience have noticed that in a crop of feathers from any bird, there are often odd plumes much smaller and inferior, mixed with those of full size. In arranging the clipping for sale, such plumes are generally stuck away in the middle, in the hope that they will not prejudice the value of the bunch as a whole. These odd inferior feathers are more likely to occur in old birds which have been carelessly treated than in young birds

which have received proper attention, and if present in any number they seriously depreciate the value of a clipping.

It is generally understood that such odd inferior feathers come from sockets which have been badly treated, usually by having previous feathers trampled out before ripeness, or by having the quills drawn while yet very green. The copious hæmorrhage produced by drawing a quill while still full of blood seems to interfere with the supply of blood to the subsequent feather, and a small inferior plume is the result. In the early days of ostrich farming it was not unusual to pluck the feathers long before the quill was ripe, but it was soon found that the subsequent crops rapidly deteriorated, becoming short and stalky. The practice is now rarely followed, though recently one prominent ostrich farmer reports having got *two crops of feathers*, spadonas and first-after-chicks, from chicks only just twelve months old.

The question has been asked whether these sockets producing odd inferior feathers in one crop ever recover or regain their original power to produce a full-size feather in a later crop. Different opinions have been expressed thereon. Some farmers assert that the sockets do recover their original vigour, while others are very doubtful. Those who hold the former view do not hesitate to pluck a half-grown feather out of time in order to start the next crop evenly, knowing full well that the next feather from the particular socket will be inferior. They consider that the socket recovers in the second crop, and a full feather appears.

An experiment now in progress will throw some light upon the problem. A hen was received some time ago which had apparently been badly treated; some of the feminas were moderately good, but mixed with them were others very short and stalky, and altogether inferior to those which the bird was capable of producing. The plumes have since been clipped, and later the quills were drawn all at the same time, and all fully ripe. The bird is now in excellent condition, and it is proposed to watch her closely to see whether all the feathers of the next crop will be of uniform quality, or whether some will be good and others inferior, as in the last clipping. No doubt, many farmers have had experiences similar to the above, and it is very desirable that they should be placed on record.

3. How far is the Character of the Adult Feather determined by that of the Early Clippings.

This question is very closely associated with the last. All agree that the characteristics of an adult ostrich, as of animals generally, are determined to a large degree by the treatment which the animal receives during its youthful growing period. An animal which has been insufficiently fed and badly treated while young, rarely attains the splendid form of one which has been well fed and properly treated during its growing period. The foundation of an animal is laid down while young, and this largely determines what it will ultimately become; later efforts are not likely to develop superior qualities if the youthful growth has been stunted.

Similarly with feathers. There is every reason for holding that the character of the feather which a bird will continue to produce is mainly determined by that of the first two or three crops. If the growth of the feather is stunted throughout these early crops, it is not probable that recovery will take place, however excellent may be the later treatment. After the third crop, the bird may be considered to have attained maturity, and its feather germs have got into the habit, as it were, of producing a certain size and quality of plume, and no amount of superior treatment will readily modify this fixity.

While the hereditary qualities, or those with which the creature is born, count for a good deal in an animal, and determine in the main what it will become, it has also to be admitted that animals are very plastic in their youth, and that the hereditary tendencies can be encouraged or restrained by the conditions to which they are subject. By high treatment of ostrich chicks the feather growth can be stimulated. and, with this foundation it is easier for the feather germs to continue to produce better feathers than it would be to start superior feather production in birds which had not attained it while young.

It is not urged that the spadonas are an altogether reliable criterion of what the later feathers will be; there are many experiences to the contrary; but it is maintained that in them part of the foundation is laid down which will determine the future clippings. This foundation is continued during the growth of the juvenal feathers and in the growth of the third crop; but from this time on very little advancement can be expected, a greater or less fixity having been reached with maturity. If a good feather has not been produced at the second-after-chicks, it is not likely to be grown afterwards; the feather-producing qualities of each socket have by that time become more or less settled, and both internal and external conditions will have much less effect than before.

Fig. 1.—An inferior twisted feather, one of a complete clipping, grown by a bird which usually produces superior feathers.

It it these considerations which impress one with the great need there is that chicks and young birds should be well treated, and maintained in the best of conditions, even at considerable expense, in order to encourage their feather producing powers to their utmost; for once these have been developed and fixed, there is not the same likelihood they will change either for better or for worse. Even if the size of the adult plume is not determined by that of the spadona, it certainly is by that of the juvenal and second-after-chick. To get the best the bird can produce, the effort must be made from the beginning.

Experience has proved, however, that an adult bird usually producing good feathers may occasionally give rise to a crop altogether inferior. Especially after an exceptionally good clipping it is sometimes found, for no reason which has yet been determined, that the next crop is almost valueless. A marked case is that shown in the photopraph (Fig. 1). The clipping previous to the one from which the feather was obtained consisted of good plumes, and, although the bird apparently continued in the same condition of health, yet all the feathers were of the same worthless character as that here shown. It is obvious there must have been some difference in the featherproducing vigour of the bird during the growth of the two crops, but without having the bird under observation it would be impossible to say in what the difference consisted. Granted that the bird was in the same condition of health on both occasions one can only surmise some seasonal or sexual influence had reduced its physiological vigour.

Some farmers consider that a nervous or excitable bird may be chased about to such a degree and so roughly handled at the time of clipping that its system does not recover from the shock for two or three months afterwards. It is therefore possible that in some instances rough handling during quilling is the explanation of an inferior crop of feathers. If so, it would emphasise the need for care in the handling of birds, and also for keeping the birds as tame as possible. The more frequently ostriches are collected and examined the less wild do they become. The explanation of rough handling would scarcely apply to cases where a whole flock produces an unusually inferior clipping; a farmer is not likely to handle his flock more roughly at one time than at another, while with odd birds this may be the case.

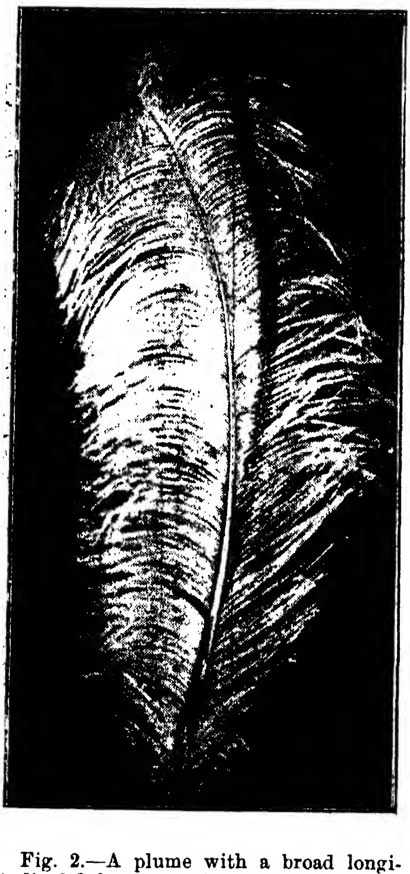


Fig. 2.—A plume with a broad longitudinal defect or vertical bar on one side. This is the third feather of the kind produced from the same socket.

The spiral nature of the sample feather here shown is such as one usually considers to result from careless quilling, but a suggestion of this nature could not be associated with such progressive farmers as Messrs. Rayner and Roberts, Tarka Bridge, from whom the feathers were obtained, particularly as all the feathers on both wings were of the same inferior type. In such a case there is every probability that the germs in the sockets have the power of recovery, and that the next clipping will consist of full perfect feathers. In connection with spiral plumes it may be mentioned that such often seem to result from feathers which in the process of growth do not properly overlap one another and thereby keep one another flat. Odd feathers, growing out of time, are frequently spiral through not having others adjacent to them.

4. An Injured Socket Continues to Produce Malformed Feathers.

Among the number of whites or feminas met with on an ostrich are frequently found single plumes which are malformed, and consequently more or less valueless. Sometimes the feather from the one socket will be split into two imperfect feathers, or a rod-like growth may grow along with a more or less normal feather; Mr. Hougham Abrahamson, of Hougham Dale, has recently sent such a freak feather in which three imperfect plumes have grown together from a single socket. A more familiar defect, however, is one in which the feather throughout its length exhibits an irregularity in the flue like that shown in the photograph (Fig. 2). Such defects are sometimes described as vertical or longitudinal bars,

but it must be understood they have no connection whatever with the more prevalent cross bars which are produced by constrictions round the growing feather.

All these malformed or freak feathers are due to some injury to the feather germ by which the parts of the feather are not formed in the regular manner. In the case of two or three imperfect feathers from one socket it may be assumed that the feather germ has been torn or divided into two or three parts, and an incomplete feather comes from each part. The vertical bar may be compared with the longitudinal ridges or grooves often found on one's nails, and which are due to some injury to the bed of the nail in the region of the new growth.

The feather photographed was obtained from Messrs. Rosenbaum, Lax & Co., Grahamstown, having been grown by Mr. J. Alban Gardiner, Stapelford, Kendrew, and its special interest lies in the fact that the same socket always produces a feather with a longitudinal bar. In fact three consecutive feathers (1906 to 1908) have now been obtained all from the same socket, and all show a like defect. This and similar instances seem sufficient to justify us in the conclusion that a feather germ or socket once injured, either accidentally or by careless quilling, will probably never recover, but continue to grow a malformed feather with each crop.

INSPECTION OF FRUIT FOR EXPORT.

The Government is now carrying out at the Cape Town Docks a system of Inspection of Fruit intended for export in accordance with the provisions set forth hereunder. It has been arranged that such inspection shall be conducted personally by one or more inspectors appointed by the Department, and these officers shall furnish full reports for the use of shippers. Exporters may be present at the inspection of their fruit, or may send representatives.

CONDITIONS.—1. Each intending exporter of fruit who wishes to avail himself of inspection by a Government Officer (hereinafter called the Inspector) at the Cape Town Docks, of all fruit which he proposes to export, must previously complete the necessary form of agreement with the Department of Agriculture, and forward this document to the Director of Agriculture, Cape Town, accepting these conditions, and stating at the same time the distinctive mark which he will place on his fruit boxes. He will be informed in due course that his name and address and distinctive mark have been registered and his fruit will be accepted, from and after a stipulated date, by the Inspector for examination prior to shipment. Forms of agreement to be signed by intending shippers of fruit may be obtained on application to the Department of Agriculture.

2. Every box of fruit considered by the Inspector as suitable for export will be branded by him with the Cape of Good Hope Coat of Arms encircled by the words "Passed by Government Inspector," and for each consignment examined by him a charge at the rate of 1s. 6d. per 40 cubic feet will be made to the exporter.

3. The disposal of boxes of fruit not passed and branded by the Inspector in terms of Condition 2, and subject to the provisions of par. 8, and for that reason not to be exported, must be arranged by the exporter with the Harbour Board and with local agents in Cape Town. Fruit not passed by the Inspector can in no circumstances be shipped.

4. Every registered exporter must pay to the Harbour Board the charges for cold storage and make his own arrangements for the disposal of his fruit in Europe.

5. The size of box in which fruit is packed for export in cool chamber must be, for all classes of fruit, either 18 by 12 inches or 18 by 24 inches, the depth being optional.

6. Every box of fruit submitted for inspection must be:—

(*a*) Clearly marked, *on one end thereof*, with the registered mark of the exporter, or his name or other means of identification, and, except in the case of grapes, with the grade (either "extra selected," "selected," or "graded"), the variety and the number of fruits contained therein.

(*b*) Consigned to the Dock Superintendent, Cape Town, and also bear the address of the agent appointed by him for disposal of his fruit in Europe.

7. All fruit, other than grapes, *must* be wrapped in tissue paper and *may* in addition be placed in wood wool. Grapes *must* be placed in wood wool and *may* also be wrapped in tissue paper.

8. All fruit, other than grapes, must be divided into two grades, namely "extra selected" and "selected." and fruit eligible for such classification only shall receive the Government brand. It shall, however, be permissible to ship perfectly sound, well selected fruit of approved varieties, the size of which shall not warrant classification as "selected," but which shall not be below "Minimum Grade." The sizes of "Minimum Grade" are set forth in this notice, and such fruit *must*

merely be marked with the word "graded" and the variety and number of fruit in each box. The word "choice" *must under no circumstances be used* as descriptive of "minimum grade" fruit.

9. All fruit must be of first rate quality, free from all blemishes affecting the appearance of the fruit, evenly graded and uniform in size, of the characteristic shape of its variety; and only one variety of fruit must be packed in a single box. Any box containing fruit which fails in any of these requirements, or is of a variety specified hereunder as unsuitable for export will not receive the Government brand.

10. All fruit must arrive at the Harbour Board Cold Storage, Docks, Cape Town, not later than Sunday morning, to permit of shipment by the steamer sailing on the following Wednesday, unless special arrangements have been made with the Union Castle Steamship Company regarding cold storage by the exporter elsewhere than at the Docks; in which latter event the fruit must arrive at the Harbour Board Cold Storage in time for inspection, and must be accompanied by a certificate that it has been in cold storage 48 hours prior to forwarding, and must be forwarded to the Harbour Board Cold Storage in refrigerator car.

11. The under-mentioned are the minimum sizes of fruit which can be submitted for inspection as "extra selected" and "selected" respectively, and the varieties which will not receive the Government brand. Owing to shrinkage, it is recommended that all stone-fruits be graded ⅛ inch larger than the sizes mentioned. The Inspector shall, however, exercise a wide discretion in dealing with blemishes of a non-injurious nature in the inspection of fruit.

Apples.—No minimum size is fixed, but the fruit must not be small. Varieties ripening prior to Ribstone and Jonathan will not receive the Government brand.

Pears.

Variety.	"Extra Selected."	"Selected."	"Minimum Grade"
Bon Chretien	3 inches.	2½ inches.	2¼ inches.
Comice	3 ,,	2½ ,,	2¼ ,,
Louise Bonne	2¾ ,,	2½ ,,	2¼ ,,
Beurre Bosc	2¾ ,,	2½ ,,	2¼ ,,
Winter Nelis	2¾ ,,	2⅜ ,,	2⅛ ,,
Beurre Hardy	2¾ ,,	2¼ ,,	2 ,,
Glout Morceau	3¼ ,,	2⅜ ,,	2¼ ,,
D'Angouleme	3½ ,,	2¾ ,,	2¼ ,,
Clapp's Favourite	3¼ ,,	2½ ,,	2⅛ ,,
Easter	3½ ,,	2¾ ,,	2¼ ,,
Diel	3½ ,,	2¾ ,,	2¼ ,,
Keiffer	3½ ,,	2¾ ,,	2¼ ,,
Pitmaston	3½ ,,	3 ,,	2½ ,,
Cape Kalabas	3½ ,,	3 ,,	2½ ,,
Safraan	3½ ,,	3 ,,	2½ ,,
Magnate	3 ,,	2½ ,,	2¼ ,,
Souvenir du Congres ...	3 ,,	2½ ,,	2¼ ,,
Winkfield...	3 ,,	2½ ,,	2¼ ,,
Gansel's Bergamotte ...	3 ,,	2½ ,,	2¼ ,,
Clairgeau	3 ,,	2½ ,,	2¼ ,,
Josephine	2½ ,,	2¼ ,,	2⅛ ,,
White Doyenne	2¾ ,,	2½ ,,	2⅛ ,,
Superfine	2¾ ,,	2½ ,,	2¼ ,,
Forelle	2½ ,,	——	2¼ ,,
Fertility	2½ ,,	——	2¼ ,,
Tongre	2½ ,,	——	2¼ ,,
Durandeau	2½ ,,	——	2¼ ,,
Le Comte	2½ ,,	——	2¼ ,,

The varieties known as December and Jargonelle shall not be shipped. Keiffer, Le Comte, Cape Kalabas, Safraan, Winkfield Clairgeau, Souvenir du Congres must be marked "Stewing," and these varieties shall not receive the Government brand.

Peaches.

Variety.	"Extra Selected."	"Selected."	"Minimum Grade"
Early Rivers	2¾ inches.	2⅜ inches.	2⅛ inches.
Cape variety of red melting type of "free stone"	2⅜ "	2⅛ "	2 "
All other varieties	2½ "	2¼ "	2 "

Yellow fleshed varieties and all varieties of Clingstone and Gladstone shall not receive the Government brand.

Nectarines.

Variety.	"Extra Selected."	"Selected."	"Minimum Grade"
All varieties	2¼ inches.	2⅛ inches.	1⅞ inches.

Clingstones shall not receive the Government brand.

Apricots.

Variety.	"Extra Selected."	"Selected."	"Minimum Grade"
All varieties	2¼ inches.	2 inches.	1⅞ inches.

Early varieties shall not receive the Government brand.

Japanese Plums.

Variety.	"Extra Selected."	"Selected."	"Minimum Grade"
Satsuma	2¼ inches.	2 inches.	1¾ inches.
Kelsey	2½ "	2⅛ "	2 "
Wickson...	2½ "	2⅛ "	1⅞ "
Apple...	2¼ "	2 "	1¾ "
Simoni	2½ "	2⅛ "	1⅞ "
Ogon	2⅛ "	1⅞ "	1¾ "
Shiro	2⅛ "	1⅞ "	1¾ "
Chalcot	2¼ "	2 "	1⅞ "

Burbanks, Botans, Ogon and Shiro shall not receive the Government brand.

Domestic Plums.

Variety.	"Extra Selected."	"Selected."	"Minimum Grade"
Ponds	1½ inches.		1¼ inches.
Coe's Golden Drop ...	1½ ,,		1¼ ,,
All other varieties ...	1¼ ,,		1⅛ ,,

Only "Extra Selected" grade domestic plums will receive the Government brand.

Grapes.

No standard sizes have been fixed for this fruit, and all varieties will be eligible for the Government brand, provided the fruit is in good condition, the bunches and berries of satisfactory size, and the bunches properly trimmed and cleaned. The division into grades does not apply, but the instructions issued by the Department of Agriculture should be carefully observed. The net weight of fruit with allowance of 10 per cent. for shrinkage, and the variety, should be worked on each box.

Provision will be made at a later date by this Department, acting on the advice of the Fruit Export Committee, for new methods of packing and new varieties of grapes.

N.B.—In the case of any variety of fruit not specified in the foregoing list being offered for export, it will be left to the discretion of the Inspector whether such fruit shall receive the Government brand.

It is urged upon all shippers that they may make themselves familiar with the circular issued dealing with the Export of Fruit, copies of which in English or Dutch, can be obtained from the Department on application.

FRUIT EXPORT.

Return of Fruit Shipped from Cape Colony during October, 1908.

Port of Shipment.	Destination.	No. of Packages.	Description of Fruit.	Quantities.	Value. £ s. d.
Cape Town ...	German South West Africa	215	Oranges ...	41,215	109 7 6
,, ...	,, ...	54	Apples ...	9,460	46 0 0
,, ...	,, ...	15	Lemons ...	1,607	5 11 0
,, ...	,, ...	23	Bananas ...	16,100	21 12 0
,, ...	,, ...	11	Naartjes ...	2,375	6 8 0
,, ...	,, ...	8	Pineapples ...	572	5 19 0

CORRESPONDENCE.

Erosion and Desiccation of the Karoo.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In the November issue of the *Journal* appears an interesting letter from Mr. E. R. Bradfield upon the above momentous subject. That, as Mr. Bradfield states, a large area of the Cape Colony is becoming a "howling wilderness" is, unfortunately only too true. Ample evidence of this, and suggested methods of prevention, are set forth in a book recently published, entitled, "Utilisation of Flood Water." It is, however, to be regretted that when the 1906 Irrigation Bill was before the Cape Parliament Mr. Bradfield should have lent his powerful advocacy in the public Press against those who were striving to bring about such an alteration in the law as would—the rights of lower proprietors being safeguarded—protect and encourage those who were endeavouring, by the arrest and distribution of flood waters, to remedy the deterioration of the country.—Yours, etc.,

F. W. PACK.

Schoombie, 23 November, 1908.

Farmers and Forest Trees.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I am in entire agreement with Mr. R. P. Malan, whose letter on the above subject appears in your November issue, as to the duty of the farmer to plant trees; but I differ with him as to the necessity of running to the Government for pecuniary assistance. The Tokai plantation can, and does, supply every kind of tree required, and from the private plantation at Molteno excellent trees can be procured at £3 per thousand, with a reduction on taking large quantities. I have planted out this season a thousand trees, Pinus Insignis, Pinus Pinaster and Halepensis, and even in this rainless season the trees are doing well. The one and great drawback is that 150 of the trees have been eaten off by some animal, either meerkat or springhare, and I should be much oblegid if Mr. Malan, or any of your readers, could kindly suggest some remedy for this.—Yours, etc.,

F. W. P.

Schoombie, 23 November, 1908.

Persian Woolled Sheep.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I notice in your last issue of the *Journal* one of our friends seeking some information *re* the above-mentioned sheep, and I have much pleasure on replying as follows:—Some ten months ago I received a young ram, just imported. It is ten months old. When I received the sheep he looked very miserable, but I thought I

would give it a trial. After having fed it for about three weeks on lucerne and oats, I turned him away with my flock. The sheep began improving at once, and this was between March and May when we were without rain for nearly twelve months, and he got his first two teeth in the same time. I had about forty ewes which were skipped by the first rams I had with the flock, and they have now all lambed from the Persian ram. The lambs are mostly from bastard ewes, a few with Merino's. They all look well, large and healthy. I would recommend, if slaughter stock is required, to cross with bastard ewes. This cross I consider also hardier than when crossed with Merinos. The young cross-bred rams have taken the fancy of several of my neighbours and others, and I have sold everyone for crossing with bastard sheep. The sheep is very active in roaming about, and climbs all through my mountains, wherever the bastards think of going. I have just clipped the ram with a ten months' fleece weight 3 lbs., length 5 inches. If any further information is required I would be pleased to reply to same.—Yours, etc.,

A. S. BEYLEVELD.

Olyvenkloof, P.O. Thebus Station, 11th November, 1908.

The Fertilisation of Turkeys.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In the October issue of the *Agricultural Journal* I notice a letter from Mr. J. D. de Wet, of Zandvliet, under the heading "A Marvellous Turkey." It is possibly not generally known that in the case of turkeys one act of coition is sufficient to fertilise the eggs for the whole season. This, however, is so a fact that Mr. De Wet may be interested to learn.—Yours, etc.,

POULTRYMAN.

Rondebosch, November 14th.

Depots and Dips.—A Cooper Rejoinder.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Our last lines to you were not written as alleged by "Hand-Dresser" in defence of the system of Dip Depôts.

We simply stated the undeniable fact that they had been the means of greatly reducing the price of dips, and we gave the most striking example of Cooper's. We further stated that the demand for it had so enormously increased in consequence as to give hope of a further reduction in price. This has since been announced. Now that the annual sale is more than enough for 20,000,000 gallons of Dip, and increasing at that, we have gladly made the further important concession of free railage and one fixed uniform price to farmers (1s 4d. per packet or £2 12s. 6d. per case) everywhere on all railways between the coast and the Zambesi

We should be very glad if "Hand-Dresser" would furnish us with an official table of railway rates proving, as he asserts, that for Sheep Dip "the railage is only a trifling 3d. per gallon for an average distance" between the Cape and the Zambesi.

It would save a great deal of money on our railage account and help towards a further reduction in price to the farmers.

If "Hand-Dresser" were to see the indisputable evidence of our books that the demand for Cooper's Dip has never looked back, but ever increases, and is still forging ahead throughout South Africa, he would never misrepresent our concession to the farmers as a desperate fight for life against the fearful odds of keen competition. He would rather see in it the clearest signs of a most vigorously growing progress and a practical appreciation by us of the splendid supremacy in which sheep, goat and cattle farmers everywhere have placed Cooper's Dip.

It has always been our policy to reduce the price as the sale increased. Our whole interest and desire lies in mutual co-operation with the farmers. We are of them and belong to them.

Mr. Austen Jackson thinks that Cooper's Dip should be made stronger for sheep than is prescribed in the directions for use. This is never necessary, and should never be. We caution farmers against it always, except for scab in Boer goats, for which it may be with advantage used stronger and warm, and every goat should be kept in two full minutes. This is necessary, because in the case of these animals the coats, the skins and the disease are quite different to sheep.

The most important thing in dipping is to see that every sheep and goat is kept in the bath until the skin is thoroughly soaked. Without this the best of dips may fail for how can it cure the disease unless it be allowed time to get at it?

For destroying the keds on sheep reported prevalent by the Chief Inspector in the November *Journal*, dipping in Cooper's has been found very effective in Australia, New Zealand and Tasmania, besides Great Britain.

With regard to the Hollings' Wool Report, you, Mr. Editor, very wisely "leave our readers to draw their own conclusions," so perhaps you will kindly permit us to venture the conjecture that Mr. Hollings, starting out as he did under the strong impression that every one of those fleeces had been dipped in lime and sulphur, looked for nothing else, and his strongly anti-lime-and-sulphur mind, working under a wrong impression, could permit no thought for anything else. We have repeatedly dipped full fleeced sheep twice in Cooper's Dip, and the wool scoured and took the dye beautifully.

All dips seem to give the wool a dry appearance after dipping, though some objectionable greasy ones may conceal it, while they also collect filth in the fleece. The action of Cooper's, however, on both skin and wool is such that the lustre is quickly restored and improved, and a free and full flow of yolk promoted with such real benefit to the growing fleeces that they come to the shearing board in splendid condition. Thousands of observant sheep farmers the world over, and growers of the most valuable wool, will tell you this. Their reliable evidence of it is thoroughly convincing.—Yours, etc.,

WILLIAM COOPER & NEPHEWS.

East London, 26th November, 1908.

Kaalziekte.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—In the September issue of your *Journal* I notice someone, signing himself "Bokboer," asking for a remedy for "Kaalziekte." It occurs here also, and a sure cure for it is flowers of sulphur. Give the mother goat or sheep a teaspoonful in the morning and the lamb half a teaspoonful; it is a good thing to repeat the dose eight days later. The sooner it is administered the better. With my kids the disease starts at the hind legs. I have never lost a single kid which had been treated in that way. This year again there were 15 kids diseased. Being ill, I had to postpone the dosing; by deferring too long I lost one.—Yours, etc.,

F. V. SMIT.

Schoombiefontein, Middelburg, C.C.

To Poison Porcupines.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—Mr. J. J. Botha, of Mooifontein, Kokstad, asks advice how to poison porcupines. The following has been tried with success: Put as much "mierengift (ant's poison) as covers the point of a knife in a potato and place the potatoes in a hole. (Cut a three-cornered piece from the potato, clear the hole a little, and replace, after having put in the poison, the cut-out piece of potato.) "Miergift" is a preparation which I have bought since I was a youth, and obtained always the same article under that name.—Yours, etc.

H. C. v. R.

Steynsburg, November 10.

The Divining Rod.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—On the above subject I too wish to say something. Although much has appeared in the *Journal*, I cannot refrain from doing so. I have seen much working with the "mikstokkie" (forked stick), but I really cannot attach any credit to it, and there are thousands who will agree with me when I maintain that there is not the slightest value in the stick, whether it has been in use for centuries or not.

How much water has not been pointed out without any other means than observing the situation of the land and so many other signs as usually present themselves?

I have noticed that people who point out water with the "stick" also keep their eyes wide open on arrival at the appointed place, where there is water, and only after having observed how the situation is, begin to use the "stick."

Such a course of action is sufficient to make anyone suspicious.

I for one doubt whether ever a good trial has been made in order to find out what it actually is.—Yours, etc.,

S. S. S.

Rietpoort, 25th November, 1908.

The Danger of the Rat.

To the Editor, AGRICULTURAL JOURNAL.

SIR, When in response to Mr. Botha's question of how to destroy field mice I gave my experience in your valuable *Journal* of the 8th October, it did not at the moment occur to me how much of importance was involved in this simple question. Since then, however, it has afforded me abundant food for thought. Through the disturbance of the balance of nature in the destruction of the birds of prey and probably other enemies by the poisoning clubs in their efforts to eradicate the jackal, also an enemy, these rodents have increased to such an extent as to become like our numerous parasites a great threatened danger and a great hindrance to our South African progress. This must be my apology, if any apology is needed, for craving more space. One can hardly estimate the incalculable amount of mischief in its various forms that this terrible scourge confers upon suffering humanity. Of course I include rats in this category. In my various avocations, apart from farming, I have got to know something to my cost of their destructive proclivities which must run into some hundreds of thousands of pounds annually if we include all the states. In densely populated European countries it amounts to many millions, the loss in England alone being computed at £10,000,000 per annum.

This question, therefore, of waging war upon the rat tribe appeals to the political economist, to the progressive farmer, our legislators and merchants, and, if I may say so, to our humanity, for they are the greatest disseminators of disease, being indirectly responsible for a great many thousands of lives. This is now being recognised by scientists and the medical profession all the world over.

Mr. Boetler, in his able article in the "World's Work" upon rat destruction in Denmark, says a measure has been introduced into the Danish Houses of Parliament which he calls a pronouncement by the Danish people of a new principle of civilisation. Its title is an act for the "Rational Destruction of Rats." He goes on to say that in England the formation of a society for the extermination of the rat is a recognition of the fact, hitherto too little recognised, that the rat is one of the most insidious enemies of mankind both as a destroyer of vast quantities of food and material and as an agent for spreading disease, and it frankly aims at the total extermination of the rat species.

The fact of the rat being the only quadruped upon which the plague flea is found is so well established even in our midst that it cannot be successfully controverted, but Zuschlag, the great propagandist of rat destruction, who has made a life study of the question, goes further, and from his researches has come to the conclusion that swine fever, horse influenza, and several intestinal diseases of animals is caused by these parasites which serve either as hosts for the parasites or being garbage feeders as vehicles for the bacili.

This is a terrible indictment against them, and is even worse than that against the innocent looking tick which has done so much to decimate the herds of South African cattle, for it includes its human victims too.

It is this feature of the case and their powers of reproduction that has aroused the scientific world to try and discover some more distinctive agent for ridding the world of so dangerous a foe.

But to illustrate more fully what is being done to combat the evil, I cannot do better than quote from Mr. W. R. Boetler's article "Microbe v. Rat." He says: Already Zuschlag's dream of a world's war against the rat is in a good way to become an actual fact. The profound interest awakened in the rat problem by the discoveries of Neumann and Danysz and the resolute action taken (mark the word) by the German and Danish Governments have given a new impetus to the old-fashioned crusade against rats by traps, ferrets and poisons. In addition to the great efforts made by the Pasteur Institute to popularise the use of its bacteriological preparation there are now over a dozen countries where Neumann's bacillus—in the form of a dough which has been treated with a culture of bacillus—is employed in enormous quantities, and the number of rats slain by both preparations every day must in the aggregate amount to hundreds of thousands. Against the tremendous power of multiplication possessed by the microbe (amounting to many millions of descendants at the end of twenty-four hours) the rat, with its progeny of eight hundred in a year from one pair has no chance of recruiting its thriving ranks. The author says the tragedy—from the rat's point of view—in this terrible war of microbe v. rat is that the rat itself is fated to help the vast armies of microbes to victory.

I don't think it is necessary to enter into further details of how the infection is spread—interested readers must find out this for themselves. All I wish to establish is that in view of the great peril that threatens us, science has opened her doors of knowledge, and it is for us to avail ourselves of her researches.

Whether these representations are true or false, where life and property are involved to such an alarming extent, it is for the Government to investigate and put these discoveries to the test. No matter what the state of our finances are, it would be far more economic than to wait until we are visited by the plague or some other foul disease when in a state of panic, as has happened before, we are apt to spend a lot of money that might be avoided.

I am sorry to take up so much of your space, but the importance of the subject demands it. However, I would only say that owing to the great mortality of our feline friends in the Peninsula which is becoming endemic, rats and other vermin are very much on the increase, particularly in woods and coppices where there is plenty of cover, and in some instances have become so daring in their depredations as to kill well-grown chickens. Therefore, apart from the human danger, it becomes absolutely necessary that some kind of action should be taken either jointly or severally to minimise the evil.—Yours, etc.

E. R. BRADFIELD.

Tantallon House, Rondebosch, November 6th.

Queen Bee.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I wish you would be so kind as to give me information through your *Journal* about the queen of bees; of if any of your readers would undertake to do so, I would also be much obliged.

How does the queen exist? As we all know, all animals have a male and a female sex. It is, however, maintained, and it has also been proved, that she is the mother of the bees, but where is the father?

Apart from the queen, we have also two other bees, the small one or working bee and the drone; of course they have their existence from the same mother bee; and this appears to me rather strange.

I would like to have information about it.

S. S. S.

Rietpoort, 25th November, 1908.

These queries were all fully explained in recent issues in the excellent contribution of Mr. H. L. Attridge on "South African Bee Keeping."—Ed.

NOTES ON THE WEATHER OF OCTOBER, 1908.

By THOMAS W. REES, B.A., LL.M., Assistant Secretary to the Meteorological Commission.

A normal mean atmospheric pressure, an exceedingly cold snap and heavy rains in the first week of the month—whereby much loss of stock was occasioned,—a general excess of rainfall, more snow than usual for the time of year, winds of greater frequency and strength than the average, a considerable number of frosts—though not severe—were the leading features of the weather of October.

DIVISION.	Mean Rainfall (1908).	Mean No. of Days.	Average Rainfall (1891-1900).	Average No. of Days.	Actual Differences from Averages.	Percentage Differences from Averages.
	Inches.		Inches.		Inches.	Per cent.
Cape Peninsula ...	3·65	10	2·78	8	+0·87	+ 31
South-West ...	1·66	7	1·73	6	—0·07	— 4
West Coast ...	0·46	3	0·80	4	—0·34	— 42
South Coast ...	5·06	12	2·26	8	+2·80	+124
Southern Karoo ...	1·82	6	0·91	4	+0·91	+100
West Central Karoo ...	1·02	4	0·62	2	+0·40	+ 65
East Central Karoo ...	1·68	6	0·66	3	+1·02	+155
Northern Karoo ...	0·41	2	0·78	2	—0·37	— 47
Northern Border ...	0·08	1	0·62	2	—0·54	— 87
South-East ...	4·79	12	2·45	8	+2·34	+ 95
North-East ...	1·12	5	1·51	4	—0·39	— 26
Kaffraria ...	5·39	13	2·64	8	+2·75	+104
Basutoland ...	3·50	7	2·34	6	+1·16	+ 50
Orange River Colony...	...	...	1·42	3	...	...
Durban (Natal) ...	8·11	21	4·46	...	+3·65	+ 82
Bechuanaland ...	0·54	2	1·04	4	—0·50	— 48
Rhodesia ...	0·50	4	0·72	3	—0·22	— 30

Precipitation.—The rainfall during the month amounted on the mean of 377 stations to the large amount of 2·70 ins., falling on 8 days, being 0·80 in. or 42 per cent. above the normal. There was a general increase in the amount recorded compared with the previous month, although there was an actual deficiency as against the average over the West Coast, Northern Karoo, Northern Border, Bechuanaland and Rhodesia, and a very slight deficiency over the South-West. The excess of rainfall was greatest over the East Central Karoo (155 per cent.), South Coast (124 per cent.), Kaffraria (104 per cent.), Southern Karoo (100 per cent.), South-East (95 per cent.) and Durban (Natal) 82 per cent. The only divisions having a rainfall of less than one inch were the West Coast, Northern Border and Bechuanaland. Summarising the monthly totals it is found that only 17 stations reported "Nil"; 14 had 0·01—0·10 in.; 48 had 0·11—0·50 in.; 41 had 0·51—1 in.; 78 had 1·01—2 ins.; 39 had 2·01—3 ins.; 42 had 3·01—4 ins.; 34 had 4·01—5 ins.; 20 had 5·01—6 ins.; 17 had 6·01—7 ins.; 13 had 7·01—8 ins.; 6 had 8·01—9 ins.; whilst 8 had more than 9 ins., viz., Evelyn Valley (King William's Town), 20·09 ins.; Port St. John's, 14·69 ins.; Hogsback (Victoria East), 11·48 ins.; Bayeza (Umtata), 10·88 ins.; Port Alfred, 10·60 ins.; Wolfridge (King William's Town), 9·89 ins.; Cwebe (Elliotdale), 9·35 ins. and Blaauwkrantz (Knysna), 9·23 ins. On subjecting the maximum daily falls to a similar scrutiny, it is found that, speaking generally, the rains were moderately heavy

and continuous, a fact which must have been extremely beneficial to the farming community. Thus of the 367 stations furnishing details, and excluding the 17 stations with no rainfall, 118 had 0·01—0·50 ins.; 126 had 0·51—1 in.; 93 had 1·01—2 ins.; 11 had 2·01—3 ins.; leaving two with maximum daily amounts of over 3 ins. These were Evelyn Valley with 3·44 ins. on the 21st, and Hogsback with 3·19 ins. on the 6th. *Thunderstorms* were slightly more numerous than during the previous month, 193 occurring on 25 days of the month. This class of storm was of daily occurrence from the 1st to the 7th, and and from the 16th to the 31st. They were most widespread on the 1st, 2nd, 5th, 21st and 29th, particularly on the 21st. *Hail* fell at 35 stations on 11 days, chiefly on the 5th and 29th. *Snow* fell at 27 stations on 6 days, principally on the 5th. Some of these storms were severe. At Barkly East, on the 5th, it was "heavy"; at Tent Kop (Maclear), on the morning of the 30th, the snow covered the ground to the depth of 3 ins., and at Qacha's Nek (Basutoland) the snow on the 1st was over 6 ins. deep. At the Hon. G. H. Maasdorp's farm, Winterhoek (Graaff-Reinet) there was snow lying on the ground to the depth of 2¼ ins on the 6th. Half-way between Graaff-Reinet and Murraysburg it was 2 ft. thick, the Karoo bushes being covered.

Temperature, Cloud, and Wind.—The month, as a whole, was exceptionally cool, the mean temperature (60·0°) being 3·2° lower than the average. The mean maximum (70·1°) was 5·6° and the mean minimum (49·9°) was 0·9° lower than the average. The mean daily range was, therefore, only 20·2°, or 4·6° less than usual during October. The highest mean temperature was at Hope Fountain (73·7°), and the lowest Disa Head (Table Mountain) with 50·6°. The highest and lowest mean maximum were also respectively at Hope Fountain and Disa Head, the former being 87·8° and the latter 56·3°. The highest mean maximum was also at Hope Fountain (59·6°), and the lowest mean maximum at Hanover (39·2°). The mean of the highest readings was 86·2°, this amount being 2·2° lower than in the corresponding month last year, and only 3·2° more than last month. The mean of the lowest readings was 40·4°, or 2·1° more than in October last. The mean monthly range was therefore 45·8°. The highest temperatures of the month for the month were 99·0° at Kimberley, on the 16th; 96·2° at Hopetown on the 17th; 96·0° at O'okiep, Queenstown and Hope Fountain, on the 13th, 15th and 20th respectively; and 94·0° at Port Nolloth, Storm's River and Mount Ayliff, on the 9th, 17th and 15th respectively. The lowest temperatures noted for the month were 30·0° at Hanover, on the 6th and 7th; 31·8° at Cathcart, on the 8th; 32·0° at Teyateyaneng, on the 6th; 33·0° at Kuruman and Hopetown, the former on the 6th and the latter on the 7th; 33·1° at Kimberley, on the 6th, and 34·5° at Aliwal North on the 8th. It will thus be seen that the extreme monthly range was 69·0°. The day temperature during the first half of the month were generally above the average, whilst the night temperature during the same period were usually below the average. The warmest days were usually those of the 9th, 13th, 14th and 15th, and the coldest mornings those of the 6th, 7th, 8th and 30th. *Frosts* were reported from 19 stations on 11 days, chiefly on the 5th, 6th and 7th. The mean amount of *Cloud* was exceedingly high, being 53 per cent., which amount is 11 per cent. more than the normal. The proportion of sky obscured ranged from 17 per cent. over Bechuanaland to 65 per cent. along the South Coast. The sky was most obscured at Port St. John's (80 per cent.) and least at O'okiep (9 per cent.). *Fogs and Mists* were reported from 185 stations on each day of the month, most numerously on the 12th, 13th, 22nd, 28th and 29th. The mean *Wind-force* during the month was 2·15 on the Beaufort Scale (1—12), corresponding to a mean velocity of 13·75 miles per hour. The month was unusually windy, particularly from the 2nd to the 8th, and again from the 23rd to the 25th. The wind was strongest over the Cape Peninsula, South-West, South Coast and Kaffraria, and of least force over the Southern Karoo, Northern Karoo and North-East. The prevailing morning winds were South-Easterly at Port Nolloth, South-Westerly at Dassen Island and Cape Point; Easterly at Danger Point; Westerly at Cape Agulhas; North-Westerly at Mossel Bay; thence Westerly along the coast to Port St. John's, and South-Westerly at Durban. In the interior the wind was usually Westerly or South-Westerly, except at Kimberley and O'okiep, where it was Northerly; and at Murraysburg and Umtata, where it was Southerly. The wind attained the force of a *Gale* at 53 stations on 19 days, principally on the 5th and 25th. *Hot Winds* were reported from 6 stations on 4 days. *Duststorms* occurred at 14 stations on 8 days. From Bulawayo it is reported that the worst duststorms ever experienced visited the town on the 5th. The rains during the month have been of inestimable value to the farmers. Unfortunately at the beginning of the month, they were accompanied by very strong, cold winds. The heavy rains and the cold weather at this period caused considerable loss amongst small stock—more particularly lambs. At Lemoenfontein (Beaufort West) a loss of 125 shorn Angoras occurred on the 5th on account of the rain and cold N.W. and S.W. winds. On the same date it is reported from Hopewell (Queenstown), Lady Frere (Glen Grey) and other places that sheep and cattle had died in large numbers on account of the sudden snap of cold weather at that time. At Tent Kop (Maclear) and other places the losses were also severe.

OBSERVERS' NOTES.

GROOT DRAKENSTEIN.—The first half of the month was dry and warm; the latter half was most unusually cold, with frequent light rains and much cloud. Most of the rain came from the W. and S.W., and thrice from S.E. Mean temperature 0·1° below the average. Rainfall 1·84 ins. below the average (3·18 ins.).

BIRD ISLAND.—This has been an exceptionally rough month—gales, plenty of south and south-west winds, with very high rough sea.

UITENHAGE.—Rivers moderately flooded; some damage to potato crops by continual rain; veldt in good condition.

KOKSTAD (Coyte).—Cold rains with snow opened the month and caused great losses in stock; fortunately no severe frost followed. The mean monthly temperature was considerably below the average for October, and was even lower than that for September. The weather has been very changeable, alternating cold rains with hot winds. Several cases of pneumonia in town.

VRUCHTBAAR (Wellington). A very cool October The cool weather has kept back trees and vines, and the fruit crops - which will be a good all round one will be late this season.

BLOEMHOF (Graaff-Reinet).—This part of the district came off very badly. Total rainfall for the 10 months 4·93 ins. No crops or stock to speak of. Dams empty.

NEW BETHESDA (Graaff-Reinet).—Insect pests in lucerne and fruit trees in great numbers. Water weak. Much rain wanted.

THEEFONTEIN (Hanover). Sharp frosts (ice) on 6th, 7th, 8th, 9th and 26th. Light fall of snow on 5th (not measurable). Half a gale from W. on 18th and 25th. Cold westerly winds prevailed towards end of month, with bright clear days. Drought very serious.

VARKENS KOP (Middelburg).—S., S.W. and W. winds have prevailed during the month, varied by high hot, dust-laden N.W. winds.

VOSBURG (Victoria West).—Strong S.W. winds blowing since 1st. Several windmills damaged. Very cold frost nearly every night.

ALEXANDRIA. Crops fine, some are being reaped.

HUXLEY FARM (Stutterheim).—The weather this month was more like autumn weather; very few hot days, and the rains bitterly cold. Stock doing well, and a good lambing season.

CASTLE HILL (Aliwal North).—Getting very dry. Strong west winds nearly every day. Locusts gone from the district for the present.

HOPEWELL (Queenstown).—Very cold weather the early part of the month. Great losses amongst stock.

LADY FRERE (Glen Grey). From the 5th, farmers report that sheep and cattle have died from sudden snap of cold weather in large numbers.

LAURISTON (Barkly West). Most extraordinary weather for this time of year. Heavy fall of snow, 2 feet deep, in the mountains.

SUNNYMEADE (Henning Siding). The weather this month has been very disappointing; looked well for rain on several occasions, but turned cold instead.

THIBET PARK (Queenstown).—Fearfully dry, only light showers for months, and very often weeks between these light showers.

VENTERSTAD.—Drought continues: crops suffering in consequence. Farmers have or are trekking with stock for pastures new.

KOKSTAD.—Heavy losses among sheep and lambs on account of very cold rains during the first week of the month.

SETEBA.—Cyclone on the 3rd did a great deal of damage to buildings, trees, etc., both here and in the neighbourhood.

TENT KOP (Maclear).—The weather from 5th to 7th killed some lambs in some instances 30 per cent. of those born up to that time. The cold weather and snow on the 30th also accounted for some, but on the whole the lambing season is a good one. Crops are well advanced.

Bird Island (Port Elizabeth).—This has been an exceptionally rough month. Gales of wind, rain, and plenty of south and south-west breezes, with very high sea.

Queenstown (Beswick).—The rainfall for the 10 months of this year has been 9·81 inches. The average during the past 35 years for the same period is 17·82 inches.

Carnarvon Farm (Wodehouse).—During the early part of the month, from 3rd to the 7th, 1·01 inch of rain and snow was registered. Notwithstanding this amount of rainfall, however, the drought is still bad. From the tabulated statement appended hereto it will be seen that the rainfall was slightly below the average, the number of windy days only one above, the number of frosts one below, and the number of cloudless days one above. The average over all has been fairly well maintained Most of the fruit in the district was killed by the frosts of the 20th and 21st September. Crops in dry lands are barely alive. Cattle still in very poor condition. Little or no potatoes or mealies yet. Altogether the outlook is not bright, although not quite hopeless.

	Rain.	Wind.	Frost.	Cloudless Days.
1901	2·37	6	4	0
1902	0·66	9	5	2
1903	0·92	21	7	0
1904	1·03	16	9	0
1905	1·30	12	3	4
1906	2·63	8	8	0
1907	0·22	17	12	0
1908	1·18	14	6	2

TEMPERATURE, OCTOBER, 1908.

Stations.		Mean Max.	Mean Min.	Monthly Mean.	Abs. Max.	Date.	Abs. Min.	Date.
Royal Observatory	...	69·0	53·2	61·1	82·6	13	46·5	16
ape Town (S.A.C.)	...	69·4	52·9	61·1	90·0	13	46·5	31
„ (City Hospital)	...	67·9	53·9	60·9	83·0	13	49·1	5
Table Mountain (Disa Head)		56·3	44·9	50·6	78·8	13	36·5	26
„ „ (Devil's Peak)		62·5	50·6	56·6	82·0	13	45·0	6
Wynberg	...	68·8	51·3	60·0	83·5	8	44·8	30
Groot Constantia	...	67·0	52·0	59·5	79·0	13	45·0	29
Bishopscourt	...	68·1	55·5	61·8	82·0	8	48·0	5
Ceres	...	68·8	48·7	58·8	71·0	3, 4 & 16	42·0	25 & 26
Robertson (Plantation)	...	72·5	47·7	60·1	91·0	9	36·5	29
Groot Drakenstein	...	71·4	50·6	61·0	92·6	13	41·2	30
Elsenberg (Agri. College)	...	69·4	48·1	58·8	90·4	13	35·8	30
Danger Point	...	64·1	53·3	58·7	74·0	26	47·0	30
Port Nolloth	...	64·2	48·5	56·4	94·0	9	43·5	12
O'kiep	...	73·7	46·4	60·0	96·0	13	36·1	6
Storm's River	...	66·1	47·0	56·6	94·0	17	39·0	21
Port Elizabeth (Harbour)	...	67·2	54·4	60·8	76·0	9	49·0	26 & 31
Cape Agulhas	...	64·8	54·0	59·4	76·0	18	43·0	30
Heidelberg	...	72·6	51·1	61·8	87·0	9	42·0	25
Cape St. Francis	...	65·0	54·6	59·8	72·0	9	45·0	3
Van Staaden's	...	65·7	51·8	58·8	84·0	10	43·0	8
Uitenhage	...	71·4	51·9	61·6	90·2	9	40·4	8
George (Plantation)	...	65·0	50·9	57·9	84·0	9	44·0	31
Mossel Bay	...	67·2	53·5	60·4	78·0	9 & 26	47·0	31
Concordia (Knysna)	...	66·3	52·2	59·2	82·1	9	46·2	8
Amalienstein	...	75·9	47·4	61·6	93·0	14	35·0	1
Murraysburg	...	73·3	43·8	58·5	89·0	15 & 16	38·0	5
Hanover	...	77·5	39·2	58·4	89·0	17	30·0	6 & 7
Hope Town	...	80·0	48·3	64·2	96·2	17	33·0	6
Kimberley	...	83·9	49·4	66·6	99·0	16	33·1	6
Sydney's Hope (Albany)	...	65·3	48·8	57·1	85·0	14	38·0	6
Bedford	...	67·4	47·6	57·5	85·0	15 & 28	37·0	8
Lovedale	...	69·1	50·9	60·0	87·0	27	41·0	8
Stutterheim	...	67·3	49·6	58·5	83·7	14	37·1	8
East London (West)	...	67·6	56·6	62·1	76·0	22	50·0	8 & 9
King William's Town	...	71·4	51·4	61.4	89·0	27	41·0	7
Cathcart	...	67·9	44·7	56·3	88·8	15	31·8	8
Evelyn Valley	...	62·4	45·5	53·9	77·0	27	35·0	8
Aliwal North	...	76·7	45·2	61·0	90·0	17	34·5	8
Rietfontein (Aliwal North)	...	71·9	45·0	58·4	86·3	15	35·0	8
Kokstad (The Willows)	...	70·0	46·1	58·0	89·9	15	34·6	9
Port St. John's	...	71·5	58·0	64·8	83·0	25	51·0	6 & 10
Umtata	...	70·3	51·4	60·8	89·0	25	40·0	9
Main	...	68·8	48·9	58·9	86·2	18	37·0	1
Mount Ayliff	...	72·9	50·3	61·6	94·0	15	39·0	6
Tabankulu	...	68·4	48·7	58·6	90·0	15	38·4	6
Queenstown	...	74·8	48·5	61·6	96·0	15	37·0	8
Teyateyaneng	...	73·1	46·0	59·5	89·0	17	32·0	6
Kuruman	...	83·2	46·5	64·8	91·0	11, 13, 14 & 28	33·0	5
Hope Fountain	...	87·8	59·6	73·7	96·0	20	46·7	10
Means	...	70·1	49·9	60·0	86·2	...	40·4	...
Extremes	...	...	...	...	99·0	16	30·0	6 & 7

RAINFALL, OCTOBER, 1908.

I. CAPE PENINSULA:

	INS.
Royal Observatory (*a*) 12 in. gauge	2·93
Cape Town, Fire Station ...	2·30
Do. South African College	3·17
Do. Molteno Reservoir ...	3·26
Do. Platteklip ...	3.89
Do. Signal Hill ...	2·48
Do. Hospital ...	1·99
Sea Point, The Hall ...	2·23
Do. Attridge ...	
Camp's Bay	2·21
Table Mountain Disa Head ...	
Do. Kasteel Poort ...	
Do. Waai Kopje ...	
Do. St. Michael's ...	
Devil's Peak Blockhouse ...	3·74
Do. Nursery ...	3·72
Do. Lower Gauge ...	
Woodstock, The Hall ...	2·49
Do. Municipal Quarry ...	3·27
Do. do. Nipher's Shield	3·90
Newlands, Montebello ...	3·85
Claremont, Carrigeen ...	
Bishopscourt	3·89
Kenilworth	3·01
Wynberg, St. Mary's ...	4·03
Groot Constantia	3·71
Tokai Plantation	3·40
Plumstead, Culmwood ...	2·22
Muizenburg (St. Res.) ...	5·36
Fish Hoek	
Simon's Town, Wood ...	
Do. Gaol ...	
Cape Point	1·98
Blaauwberg Strand	
Robben Island	1·07
Durbanville	
Maitland Cemetery	1·89
Tamboers Kloof	2·82
Woodhead Tunnel	4·78
Lower Reservoir, Table Mountain	3·42

II. SOUTH-WEST:

	INS.
Eerste River	1·56
Klapmuts	1·44
Stellenbosch, Gaol	1·95
Somerset West	2·05
Paarl	1·36
Wellington, Gaol	1·02
Do. Huguenot Seminary	
Groot Drakenstein, Weltevreden	1·34
Porterville Road	0·56
Tulbagh	0·97
Ceres Road	1·30
Kluitjes Kraal	1·00
Ceres	1·86
The Oaks	0·67
Rawsonville	1·23
Caledon	
Worcester, Gaol	2·04
„ Meiring	
„ Station	
Hex River	
De Doorns	

II. SOUTH-WEST (*continued*)

	INS.
Karnmelks River	
Lady Grey, Div. Robertson ...	
Robertson, Gaol	1·20
Do. Govt. Plantation ...	0·97
De Hoop	1·52
Montagu	2·13
Danger Point	1·75
Vygebooms River	3·29
Elgin Plantation	4·54
Elsenberg Agricultural College	1·33
Berg River Hoek	
Wemmer's Hoek	
Roskeen	3·95
Vruchtbaar	1·11

III. WEST COAST:

	INS.
Port Nolloth	
Do. (Lieut. Barber) ...	0·07
Anenous	0·32
Klipfontein	0·23
Kraaifontein	0·30
O'okiep	0·15
Springbokfontein	0·24
Concordia	
Do. (Kraphol)	0·15
Garies	0·38
Lilyfontein	
Van Rhyn's Dorp	0·17
Clanwilliam, Gaol	0·29
Do. (Downes) ...	
Dassen Island	0·46
Kersefontein	0·43
The Towers	0.68
Abbotsdale	
Malmesbury	0·81
Piquetberg	1·25
Zoutpan	
Wupperthal	0·12
Welbedacht	
Hopefield (Gaol)	0·49
Algeria (Clanwilliam) ...	0·93
Cedarberg (do.)	0·79

IV. SOUTH COAST:

	INS.
Cape Agulhas	1·14
Bredasdorp	2·54
Swellendam	5·24
Potberg	
Zuurbraak	
Grootvaders Bosch	7·05
Heidelberg	2·75
Riversdale	4·65
Melkhoutfontein	
Vogel Vlei	1·47
Geelbek's Vlei	
Mossel Bay	2·39
Great Brak River	4·58
George	5·44
Do. (Plantation)	5·15
Woodifield (George) ...	6·08
Ezeljagt	
Millwood	7·51

IV. SOUTH COAST (*con.*):

	INS.
Sourflats	4·90
Concordia	5.74
Knysna	3·47
Buffel's Nek	7·66
Plettenberg Bay	4·16
Harkerville	6·73
Forest Hall	
Blaauwkrantz	9·23
Lottering	5·83
Storms River	2·47
Witte Els Bosch	8·39
Humansdorp	5·77
Cape St. Francis	7·97
Hankey	
Witteklip, Sunnyside ...	8·14
Van Staden's, Intake ...	6·73
Do. On Hill ...	7·62
Kruis River	
Uitenhage (Gaol)	4·37
Do. (Park)	4·29
Do. (Inggs)	4·22
Armadale (Blue Cliff) ...	2·42
Dunbrody	
Port Elizabeth (Harbour) ...	3·58
Do. (Victoria Park) .	
Do. (Walmer Heights)	
Shark's Rivier (Nursery) ...	
Do. (Convict Station)	4·06
Tankatara	
Centlivres	
Edinburgh (Knysna) ...	

V. SOUTHERN KAROO:

	INS.
Verkeerde Vlei	
Bok Rivier	
Triangle	
Touws River	
Do. (D.E. Office) ...	
Pietermeintjes	
Grootfontein	
Ladismith	1·20
Amalienstein	2·21
Seven Weeks' Poort... ...	
Calitzdorp	1·19
Oudtshoorn	1·86
Vlakte Plaats	
Uniondale	2·56
Kleinpoort	1·89
Glenconnor	
Rust en Vrede	

VI. WEST-CENTRAL KAROO:

	INS.
Matjesfontein	
Laingsburg	
Prince Albert Road	
Fraserburg Road	
Prince Albert	0·14
Zwartberg Pass	3·95
Booi's Kraal, Beaufort West ...	
Beaufort West, Gaol ...	
Dunedin	0·18
Nel's Poort	1·19
Camfers Kraal	1·03
Lower Nel's Poort	
Krom River	0·60
Baaken's Rug	1·06
Willowmore	0 56
Rietfontein	0·56
Steytlerville	
Lemoenfontein (Beaufort West...	1·96

VII. EAST-CENTRAL KAROO:

	INS.
Buffe's Kloof	1·48
Aberdeen, Gaol	2·16
Do. Bedford	
Corndale	
Aberdeen Road	
Klipplaat	
Winterhoek	
Klipdrift	
Kendrew, Holmes	1·48
Do	1·48
Graaff-Reinet, Gaol	1·98
Do. (Eng. Yard) ...	1·82
Do. (College) ...	
New Bethesda	1·50
Roodebloem	1·48
Glen Harry	0·86
Wellwood	0·79
Do. Mountain ...	
Bloemhof	0·75
Jansenville	0·69
Patrysfontein	
Bethesda Road	
Afrikander's Kloof	
Roode Hoogte	0·64
Toegedacht	1·28
Klipfontein	1·41
Cranemere	2·08
Pearston...	1·66
Darlington	
Walsingham	
Arundale	
Doornbosch, Zwagershoek ...	
Middlewater	1·23
Somerset East, Gaol... ...	4·79
Do. Do. College ...	
Longhope	
Cookhouse	2·83
Middleton	
Spitzkop, Graaff-Reinet ...	1·76
Bruintjes Hoogte	2·88

VIII. NORTHERN KAROO:

	INS.
Calvinia	0·02
Middlepost	
Brandvlei	
Onderste Doorns	
Sutherland	
Fraserburg	0·00
Scorpions Drift	
Rheboksfontein	
Klein Vlei	
Carnarvon	0·00
Loxton	
Beyersfontein	
Wagenaars Kraal	
Brakfontein	0·58
Victoria West	0·03
Omdraais Vlei	
Doornkuilen	
Britstown	0·00
Wildebeestkooij	0·00
Murraysburg	0·63
De Kruis, Murraysburg ...	1·48
Richmond	0·47
De Aar	
Middlemount	
Hanover	0·28
Theefontein	0·02
Zwagersfontein	
Philipstown	0·23

VIII. NORTHERN KAROO (*con.*):	INS.
Boschfontein	
Petrusville	0·00
The Willows, Middelburg	0·10
Naauwpoort	
Middelburg, Gaol	0·27
Do.	
Do. (Government Farm)	
Jackalsfontein	0·38
Ezelpoort	
Plaatberg	0·23
Grape Vale	0·18
Ezelfontein	
Roodepoort	
Groenkloof	
Vlakfontein	0·75
Vogelsfontein	
Plaatfontein	0·70
Colesberg	0·45
Tafelberg Hall	0·25
Rietbult (Colesberg Bridge)	
Fish River	0·20
Varkens Kop	0·32
Culmstock	0·15
Droogefontein	0·11
Stonehills	
Cradock (Gaol)	0·47
Witmoss ...	1·57
Varsch Vlei	
Maraisburg	0·60
Steynsburg (Gaol)	0·55
Riet Vlei	
Hillmoor	0 27
Quagga's Kerk	
Tarkastad	0·64
Do. (District Engineer)	
Drummond Park	
Glen Roy	1·18
Waverley	0·82
Gannapan	
Montagu...	0·77
Grape Vale	
Rietfontein, Cradock	
Schuilhoek	0·18
Vosburg ...	0·00
Zwavelfontein	
Holle River, Colesberg	0·00
The Meadows, Schoombie	
Hartebeestefontein, Steynsburg	0·85
Hotweg Kloof, Cradock	1·15
Loeriesfontein (Calvinia)	0·41

IX. NORTHERN BORDER:	INS.
Pella ...	
The Halt	
Keimoes ...	
Kenhardt	0·00
Upington	0·00
Trooilapspan	0·00
Van Wyk's Vlei	0·04
Prieska ...	0·00
New Year's Kraal	0·18
Dunmurry	0·05
Karree Kloof	
Griquatown	0·00
Campbell	
Douglas ...	0·06
Avoca, Herbert	
Hope Town	0·30
Orange River	
Newlands, Barkly West	0·09

IX. NORTHERN BORDER (*con.*)	INS.
Barkly West	0·10
Bellsbank	0·08
Kimberley (Gaol) ...	0·15
Do. Stephens	0·17
Strydenburg	
Rietfontein (Gordonia)	0·00
Douglas (Vos)	0·06

X. SOUTH EAST:	INS.
Melrose (Div. Bedford)	1·59
Dagga Boer	2·76
Fairholt ...	3·02
Lynedoch	
Alicedale	2·37
Cheviot Fells	1·88
Bedford (Gaol)	4·63
Do. (Hall)	
Sydney's Hope	4·23
Cullendale	5·04
Adelaide...	2·93
Atherstone	5·19
Alexandria	6·19
Salem ...	
Fort Fordyce	
Fountain Head	
Graham's Town (Gaol)	6·79
Do.	
Heatherton Towers ...	2·40
Sunnyside	5·32
Vischgat...	
Fort Beaufort	3·18
Katberg ...	
Balfour ...	6·78
Seymour ...	4·90
Glencairn	7·09
Alice ...	
Lovedale...	4·27
Port Alfred	10·60
Hogsback	
Peddie ...	3·80
Exwell Park	0·54
Keiskamma Hoek	5·83
Cathcart (Gaol)	1·65
Do. (Foreman)	1·77
Do. ...	
Thaba N'doda	
Evelyn Valley	
Crawley ...	0·82
Thomas River	1·74
Perie Forest	
Forestbourne	7·31
Isidenge ...	
Kologha ...	
King William's Town (Gaol)	3·68
Do. Do. (Dr. Egan)	4·73
Stutterheim, Wylde...	
Do. Bousfield	3·62
Fort Cunynghame ...	
Dohne ...	3·09
Kubusie ...	3·53
Quacu ...	
Blaney ...	2·15
Kei Road	
Berlin ...	
Bolo ...	2·79
Fort Jackson	3·80
Prospect Farm, Komgha	
Komgha (Gaol)	4·36
Chiselhurst	5·54
East London West ...	4·99

X. SOUTH-EAST (*continued*):

	Ins.
East London East	
Cata	
Wolf Ridge	
Dontsah	
Mount Coke	
Blackwoods	6·48
Albert Vale (near Bedford) ...	2·23
Huxley Farm (Stutterheim) ...	2·88
Durban (Peddie)	2·22

XI. NORTH-EAST:

	Ins.
Venterstad	0.18
Mooifontein	1·44
Burnley, Cyphergat... ...	
Burghersdorp (Gaol) ...	0·15
Ellesmere	0·35
Molteno	
Lyndene	0·22
Cyphergat	
Thibet Park	0·84
Sterkstroom (Station) ...	1·49
Do. (Gaol)	
Rocklands	0·90
Aliwal North (Gaol) ...	1 81
Do. (Brown) ...	
Do. (Dist. Engineer) ...	
Buffelsfontein	
Hex's Plantation	
Poplar Grove	
Carnarvon Farm	1·18
Halseton...	
Jamestown	0·20
Whittlesea	0·40
Queenstown (Gaol)	1·44
Do. (Beswick) ...	
Rietfontein (Aliwal North) ...	0·95
Middlecourt	1 18
Dordrecht	1·40
Tylden	
Nooitgedacht	
Herschel...	1·57
Lady Grey	1·28
Lauriston	1·93
Lady Frere	2·09
Contest (near Bolotwa) ...	1·88
Sterkspruit	
Doornkop	
Avoca, Barkly East... ...	
Keilands...	1·75
Palmietfontein	
Barkly East	1·52
Blikana	1·49
Glenlyon...	
Rhodes	
Gateshead	
Cliftonvale	
Albert Junction	
Queenstown (Dis. Eng'rs Office)	
Hughenden	0·20
Glenwallace	1·39
Indwe (District Engineer's Office)	
Bensonvale Inst., Herschel ...	
Cathcart, Queenstown ...	
Stormberg Junction... ...	
Royal, Div. Albert	
Broughton, Molteno ...	1·50
Hopewell, Imvani	2·06
Sunny Meade, Div. Albert ...	0·28
Castle Hill, Aliwal North ...	0·57

XII. KAFFRARIA:

	Ins.
Ida, Xalanga	3·34
Slaate, Xalanga	4·89
Cofimvaba	4·02
Tsomo	2·91
N'qamakwe	5·03
Main	3·40
Engcobo	4·42
Butterworth	4·60
Woodcliff	3·98
Kentani	7·29
Maclear	3·68
Idutywa	
Bazeya	10·88
Willowvale	7·60
Mount Fletcher	3·84
Somerville, Tsolo	1·87
Elliotdale	5·68
M'quanduli	
Matatiele	
Umtata	4·69
Cwebe	9·35
Tabankulu	7·58
Mount Ayliff	5·62
Kokstad	3·94
Do., The Willows ...	4·31
Seteba	4·37
Flagstaff...	8 14
Insikeni	4·90
Port St. John's	14·69
Kilrush, Sneezewood ...	
Umzimkulu	5·21
Mandileni	
Wanstead	4·28
Cedarville	
Tent Kop, Elands Height ...	4·39
Umzimkulu (Strachan) ...	5·96
Waterfall Farm (Kokstad) ...	6·34
Elton Grange (Mount Currie) ...	3·72

XIII. BASUTOLAND:

	Ins.
Mafeteng	2·49
Mohalies Hoek	2·92
Maseru	2·78
Teyateyaneng, Berea ...	3·29
Moyeni Quthing	
Qacha's Nek	6·04
Leribe	
Butha Buthe	

XIV. ORANGE RIVER COLONY:

	Ins.
Bloemfontein	

XV. NATAL:

	Ins.
Durban, Observatory ...	8·11

XVI. TRANSVAAL:

	Ins.
Johannesburg	

XVII. BECHUANALAND:

	Ins.
Taungs	0·48
Vryburg	0·04
Mafeking	2·29
Setlagoli...	0·33
Kuruman	0·00
Zwartlaagte	
Masilibitsani	0·13

XVIII. RHODESIA:

	Ins.
Hopefountain	0·75
Rhodes Matoppo Park ...	0·26

XIX. DAMARALAND:

	Ins.
Walfish Bay	

DEPARTMENTAL PUBLICATIONS.

The follownig Departmental Publications are obtainable on application to the *Controller of Printing and Stationery, Cape Town.* Except in the case of those specially priced in the list the charge is 3d. each, post free in South Africa. Those publications marked * are obtainable in Dutch.

Agriculture.—Artificial Grasses and Fodder for Stock (6d.); Ensilage; Treatment of Cereal and other Crops (6d.); *Wheat Production in Australia, by Halse and Visser (1s. 6d.); Hop Cultivation; *Brak Land in relation to Irrigation and Drainage; *Culture and Curing of Turkish Tobacco in Cape Colony; The Velvet Bean; Potato Disease; Scheme of Manurial Experiments; Sundry Forage Crops for trial in Cape Colony; Salt Bushes; Tobacco Culture (P. Bornemisza); Cultivation of Tobacco in the Colony (K. Schenck); *The Process and Appliances for the flue-curing of Tobacco; *Wheat Production in Australia (A. C. Macdonald) (1s. 6d.); Ensilage or the Preservation of Green Fodder; Destruction of Prickly Pear, experiments upon; *Culture of Tobacco in the Kat River Valley.

Dairying.—Dairying (6d.); *Dairy Industry in Great Britain (6d.); Ready Reckoner for Cream Testing (1s.); *Cheddar Cheese Making, R. Silva Jones; *Dairy Industry in Denmark.

Entomology.—Locusts and their Destruction (6d.); Caterpillars destroying Trees; Codling Moth in Madeira Fruit; *Codling Moth; Fruit Fly; Fumigation Supplies; Methods of Locust Destruction; Pear Slug, Paris Green (Insect Notes); Remedy for Mest Wurmen; *Spray Pump Notes; Recently introduced Borer-Beetle; Scale Insects on Ornamental Trees and Plants; New Oak Tree Pest; Nurseries Inspection and Quarantine Bill; Wattle Bag Worm; Bordeaux Mixture; Deaths Head Moth Superstition; Anthracnose in Constantia; Antestia Fruit Bug; Another Introduced Scale Pest; The Fruit Moth; Snails and Caterpillars in Lucerne; The Brazil Fruit Fly Parasite; *Cyanide Gas Remedy for Scale Insects; Gas Treatment for Scale Insects; *Two Fruit Tree Beetles.

Forestry.—Forestry (6d.); British National Forestry; Botanical Observations on Forests in Eastern Pondoland; Indigenous Timbers of the Cape; Misuse of Coal and the Uses of Forests; Tree Planting for Timber and Fuel; *Tree Planting for Farmers.

Horticulture.—Netting for Fruit Trees; *Fruit Culture in the Gamtoos River Valley; Marketing of Fruit; The Olive at the Cape; Fruit Culture in Argentina; Vegetables for Exhibition; *Citrus Culture in the Cape Colony; Treaties on Citrus Culture from Seed to Fruit; *Fruit Tree Pruning; *Fruit from Orchard to Buyer; White Mulberry in Cape Colony.

Veterinary and Animal Industry.—Arsenite of Soda Dipping Mixture; Horse Sickness; *Poisoning of Stock; Persian Sheep and Heartwater; Bots or Paapjes; Indigestion and Diarrhœa in Calves; Husk, Hoose or Parasitic Disease of the Lungs of Cattle, etc.; *The Eye and its Diseases; *Redwater, Texas Fever or Tick Disease; *Glanders; *Animal Castration; *Preventive Inoculation for Redwater; *Abortion in Cattle; *Rinderpest in South Africa; Styfziekte and Lamziekte; *Fluke or Slak in the Liver of Sheep; Redwater in Cattle; *Anthrax or Miltziekte and Quarter Evil or Sponsziekte; *Preventive Inoculation against Miltziekte; *Osteo-Porosis; Cirrhosis of the Liver in Stock; *Retention of the Fœtal Membrane or Afterbirth in Cows; Castration of Ostriches; Stijfziekte, Lamziekte or Osteo Malacia and Paralysis; Castration of Animals (the Horse); *Lungsickness of Cattle, Contagious Pleuro-Pneumonia, etc.; *Swine Fever, Hog Cholera or Pig Typhoid; Notes on the Co-Relation of several Diseases occurring among Animals in South Africa; Castration of Females and Animals other than the Horse; Dr. Kohlstock's Report on his Rinderpest Investigations at Kimberley; Professor Koch's Report on his Rinderpest Investigations at Kimberley; *Poisoning of Horses by Ornithogalum-Thrysoides or Chinkerinchee; Horses suitable for Military Requirements; Ticks and African Coast Fever; *Liver Disease in Calves; Lampas; Swine Fever; *Tuberculosis and the Use of Tuberculin; *Lungsickness in Cattle; *Treatment for Worms in Domestic Animals; *Malarial Catarrhal Fever in Sheep; *Inoculation against Rinderpest; *Miltziekte en Sponsziekte; *Heartwater; *Anthrax, Charbon, Miltzbrand or Miltziekte; *African Coast Fever, with description of Dipping Tank.

Viticulture.—Viticulture and Wine Making (6d.); *Manufacture of Dry Wines in Hot Countries; *Reconstitution of Phylloxerised Vineyards (1s.); *How to treat Wine Casks; The Making of Wine and its Bye-Products (6d.); *Report on Failure of Hanepoot Grapes on American Vines; Grafting of American Vines; Vine Culture as exemplified at the Paris Exhibition; Wine Making, Further Notes on, by G. Paine.

Miscellaneous.—*Poultry in South Africa; Fertility of some Colonial Soils as Influenced by Geological Conditions; *Mining Laws; The Protection of Trout; Trout and Carp Breeding and Stocking of Streams; *Locust Birds and Locust Poison; Land Laws of Cape Colony; Rainfall of South Africa; Game Seasons; Transvaal Plant Import Regulations; Preservation of Game in Cape Colony; The Ocean and its Resources; Possible New Industries for Cape Farmers (6d.); Arsenate of Lead; Blepharis Capensis; *Method of Preserving Fish by Smoking; *Monsonia, Cape Cure for Dysentery.

APPLICATIONS FOR AGRICULTURAL EMPLOYMENT.

Youth, inexperienced, now in England, is desirous of obtaining employment on a farm in this Colony. Reply to A. PEARSON, 13, De Lorentz Street, Cape Town.

Employment on a stock farm wanted for the purpose of learning. Willing to be apprenticed. Reply E. S. ABBOTT, P.O. Box 255, Cape Town.

Elsenberg student shortly leaving college, having completed his course, is desirous of employment as under-manager on a good stock farm within about 100 miles of Cape Town. Would accept a small salary. Speaks Dutch fluently. About 19, strong, healthy and not afraid of hard work. Reply IVOR J. EDWARDS, Elsenberg Agricultural College, Mulder's Vlei.

Elsenberg student, completing full course at end of session, desires employment on a farm (ostrich farm preferred). Would accept a small salary as a beginning. Reply HERBERT WOOF, Elsenberg Agricultural College, Mulder's Vlei.

Elsenberg student, completing full course at the end of the year, seeks employment on farm. Fruit or dairying preferred if possible. Reply RICHARD B. COOK, Elsenberg Agricultural College, Mulder's Vlei.

E. S. Meadows, of Templestowe, Mowbray, is desirous of obtaining employment on any farm. Is willing to give his services in exchange for board and lodging for a reasonable period.

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, the 21st November, 1908, ruling at the several centres named, is published for general information.

CENTRE.	A. Wheat per 100 lbs.	B. Wheat Flour per 100 lbs.	C. Boer Meal per 100 lbs.	D. Mealies per 100 lbs.	E. Mealie Meal per 100 lbs.	F. Barley per 100 lbs.	G. Oats per 100 lbs.	H. Oat-hay per 100 lbs.	J. Potatoes per 100 lbs.	K. Tobacco (Boer Roll) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		
Aliwal North ..	0 12 0	0 14 6	0 15 0	0 10 0	0 11 3	0 7 0	0 10 0	0 6 6	0 17 6	0 2 0	0 0 7	0 0 6½	0 1 9	0 1 0	£9	13/9
Beaufort West ..	0 12 9	1 0 0	0 14 9	0 10 0	0 10 0	0 10 0	0 10 0	0 6 0	0 13 4	0 0 6	*3d., 4½d.	*3d. 5d.	0 1 3	0 1 3	£9	16/-
Burghersdorp ..	0 11 6	0 17 0	1 8 6	0 8 6	1 1 0	0 8 6	0 16 0	0 5 6	0 10 6	0 0 6	..	0 0 5½	0 1 6	0 1 0	..	..
Cape Town ..	..	..	..	..	..	..	..	..	0 6 4	..	..	..	0 1 3	0 1 0	..	..
Clanwilliam ..	0 12 3	..	0 13 6	0 9 0	..	..	0 8 0	..	0 7 0	0 1 0	0 0 6½	0 0 6½	0 1 3	0 1 0	..	..
Colesberg ..	..	..	..	..	..	0 6 8	0 5 9	0 3 3	..	..	..	0 0 4	1 2 to 1 6	9d. to 1 -	..	..
Cradock ..	..	..	0 13 6	0 10 0	..	0 9 0	..	0 5 0	0 8 0	0 0 6	0 0 6	0 0 5	0 1 0	0 1 0	..	..
Dordrecht ..	0 10 0	0 16 6	0 14 6	0 11 0	0 12 6	0 7 0	0 9 6	0 9	0 19 0	0 1 0	0 0 4½	0 0 5	0 1 0	0 1 5	£8	13/6
East London ..	0 9 0	0 16 3	1 7 0	0 9 6	0 19 6	0 8 0	0 7 0	0 2 7	0 8 0	0 1 0	0 0 5	0 0 5½	0 1 6	0 1 0	£11	22/-
Graaff-Reinet ..	..	..	..	0 7 6	..	..	..	0 6 0	0 12 0	..	0 0 6	0 0 6	0 1 6	0 1 0	£11	18/-
Grahamstown ..	..	..	..	0 9 9	..	0 6 2	0 10 6	0 4 0	0 8 9	0 0 6	0 0 6	0 0 6	0 1 6½	0 1 0	..	..
Kimberley ..	0 10 6	0 16 0	0 13 9	0 8 0	0 9 5	0 5 11	0 6 6	0 4 7	0 11 0	0 0 5	0 0 8½	0 0 7	..	0 1 0	£10 5s.	15/3
King William's Tn..	0 10 0	0 17 0	0 14 0	0 9 9	0 8 0	0 5 6	0 9 0	0 1 9	0 8 0	0 0 6	0 0 6	0 0 6	0 1 3	0 0 9	£12 10s.	22/-
Malmesbury ..	0 10 0	0 15 0	0 11 6	0 8 6	..	0 6 0	0 4 0	0 2 3	0 15 0	0 0 3	0 0 6	0 0 6	0 1 2	0 0 10	£8	19/-
Mossel Bay ..	0 14 0	0 14 0	0 14 6	0 12 0	0 12 6	0 8 0	0 7 0	0 4 6	0 8 6	0 0 6	0 0 7	0 0 8	0 1 3	0 0 9	..	..
Port Alfred ..	0 12 0	0 18 0	0 17 0	0 10 0	0 12 6	0 7 6	0 10 0	0 2 0	0 8 0	0 0 6	0 0 8	0 0 8	0 1 3	0 0 6	..	..
Port Elizabeth ..	0 10 6	..	..	0 8 6	..	0 4 3	0 6 6	0 4 0	0 12 9	..	0 0 7	0 0 7	0 1 5	0 1 2	..	..
Queenstown ..	0 11 0	0 15 6	0 13 3	0 10 0	0 11 0	0 7 6	0 9 0	0 4 0	0 8 6	0 0 10	0 0 5	0 0 6	0 1 6	0 1 3	£12 to £14	18/- to 22/-
Tarkastad ..	0 14 0	0 10 6	0 16 6	0 8 6	0 10 6	0 10 0	0 9 0	0 8 0	0 7 0	0 1 0	*0 0 6	*0 0 6	0 1 6	0 1 0	£10	20/-
Vryburg ..	0 14 0	1 0 0	0 13 0	0 8 6	0 10 0	0 11 0	0 9 0	0 3 0	1 0 0	0 1 4	0 0 8	*†5d. to 9d.	*†5d to 6d	0 0 9	£10 to £13	15/- to 16/-
Worcester ..	0 10 0	0 15 0	0 11 6	0 7 6	0 8 6	0 6 8	0 6 0	0 2 6	0 6 8	0 0 5	4d. to 7d.	0 0 5	0 1 3	0 0 9	£4 to £10	15/- to 17/6

NOTE.—A blank space denotes "no transactions." * Colonial. † Frozen-

PRODUCE. MARKETS.

CAPE TOWN.

Mr. R. Müller (Produce Department) reports for the month ending November 30th :

Ostrich Feathers.—Supplies have come forward freely, and all good quality has met with an active demand. My advices from London are that, although a large quantity has been catalogued, prices are steady and good competition prevails. In our local Market, all good quality has shown an upward tendency, but common goods create little sympathy.

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
Super Primes ...	15	0	0	35	0	0	Floss	0	5	0	1	15	0
First, ordinary to Super	10	0	0	14	0	0	Long Drabs	2	0	0	3	10	0
Seconds	5	0	0	9	10	0	Medium Drabs ...	0	15	0	1	10	0
Thirds	3	0	0	4	0	0	Short to Medium ...	0	5	0	0	15	0
Femina Super ...	10	0	0	15	0	0	Floss	0	5	0	1	15	0
Do., Seconds to Firsts	3	10	0	9	10	0	White Tails	1	0	0	2	10	0
Byocks (Fancy) ...	5	0	0	9	0	0	Coloured Tails ...	0	5	0	1	10	0
Long Blacks	3	10	0	7	0	0	Chicks...	0	1	0	0	2	0
Medium Blacks ...	1	10	0	3	0	0	Spadonas	2	0	0	3	0	0
Short to Medium ...	0	10	0	1	5	0	Inferior Black and Drabs, short to long	0	0	6	1	10	0

Wool.—The London Sales opened on the 24th ult. with spirited competition, prices advancing from 5 per cent. to 7½ per cent. This news was not unexpected, and anticipating it, our local Market has been firmer during the past week or two. There has been animated competition for all parcels showing good yield, Long Wools and Lambs alike sharing the attention of buyers. Calvinias may be quoted from 5¼d. to 6½d. ; Karoos, from 6¼d. to 7¼d. ; Roggevelds, from 6½d. to 7½d. Super Caledons up to 8d., according to quality and condition. Wasty lots received more restricted attention.

	s.	d.	s.	d.		s.	d.	s.	d.
Super long Grass Veld ...	0	7	0	8	Wool for Washing	0	4½	0	5½
Do. Karoo	0	5½	0	7¼	Snow-white Super to Extra	1	4	1	7
Medium	0	4	0	5¼	Do. Ordinary ...	1	1	1	4
Short and inferior	0	3½	0	4	Fleece Washed	0	0	0	9

Mohair.—The Market is steady. Business was more or less confined to long-stapled Firsts and Kids of fine quality, and in these a considerable turnover has taken place in Bradford. As in Wool, so in Mohair, quality is the *sine qua non*; but perhaps this is rather more pronounced in Mohair, for quality guarantees the price, because this is ruled by the counts of yarn to be spun out of it.

	s.	d.	s.	d.		s.	d.	s.	d.
Firsts, Summer	0	8½	0	11	Winter	0	7	0	8½
Kids	1	0	1	5½	Do. Kids...	0	11	1	1
Seconds	0	5	0	6					

Hides and Skins.—The Market is strong. Prices have advanced to 9d. for Heavy Goats, to 1s. 1d. for Light Goats, and to 2s. for Butcher Capes; other sorts remain unchanged. Hides are in good request, and there is an upward tendency.

	s. d.	s. d.
Long woolled Skins ...	0 4¾	0 5½
Short...	0 3½	0 3¾
Shorn	0 2¾	0 3
Bastards	0 2¾	0 3¼
Cape Skins, each	1 6	2 0
Do., cut, each ...	0 0	1 0

	s. d.	s. d.
Goat, heavy to light ...	0 9	1 1
Sundried	0 0	0 5
Angoras	0 0	0 4½
Sundried Hides	0 5	0 7¼
Salted	0 4½	0 6
Wet...	0 3	0 3½

PORT ELIZABETH.

Messrs. John Daverin & Co. report under date November 27th :—

Ostrich Feathers.—The market was heavily supplied this week with a good average assortment. Competition was active, and full prices were paid for all descriptions. Out of hand little or no business has been done. The London Sales open on Monday next, and the result is looked forward to with much interest by both buyers and sellers. The total quantity sold on the public market this week amounted to £16,021 16s. 2d., and weighed 5,902 lbs. 9 ozs.

		£ s. d.		£ s. d.
Primes :	Extra Super	Special Prices.		
	Good to Super ...	15 0 0	to	25 0 0
Whites :	Firsts ...	10 0 0	,,	15 0 0
	Seconds ...	5 0 0	,,	9 0 0
	Thirds ...	0 10 0	,,	3 10 0
Feminas :	Super ...	10 0 0	,,	15 0 0
	Firsts ...	7 10 0	,,	11 0 0
	Seconds ...	3 10 0	,,	7 0 0
	Thirds ...	0 5 0	,,	3 0 0
	Greys ...	2 0 0	,,	6 10 0
Fancy		3 10 0	,,	8 0 0
Tails :	White	0 10 0	,,	2 15 0
	Light	0 10 0	,,	1 15 0
	Coloured & Dark	0 1 0	,,	0 15 0

		£ s. d.		£ s. d.
Blacks :	Long ...	3 0 0	to	6 10 0
	Medium ...	1 0 0	,,	3 0 0
	Short ...	0 5 0	,,	0 17 6
	Wirey ...	0 0 3	,,	0 0 6
	Floss ...	0 5 0	,,	1 7 6
Drabs :	Long... ...	1 5 0	,,	3 10 0
	Medium ...	0 12 6	,,	1 10 0
	Short... ...	0 2 6	,,	0 7 6
	Wirey ...	0 0 3	,,	0 0 6
	Floss... ...	0 5 0	,,	1 10 0
Spadonas :	Light ...	0 5 0	,,	3 10 0
	Dark ...	0 2 6	,,	2 0 0
Chicks...		0 0 3	,,	0 2 0

The following may be quoted as the approximate current values of unsorted parcels, per line :—

	Whites.	Feminas.
Superior pluckings	£8 0 0 to £9 0 0	£5 10 0 to £6 10 0
Good Average lots	7 0 0 to 8 0 0	4 10 0 to 5 10 0
Poor Average lots	5 0 0 to 6 10 0	2 10 0 to 3 15 0
Common lots, stalky, narrow and discoloured	3 10 0 to 4 10 0	1 10 0 to 2 10 0

	Tails. s. d. s. d.	Blacks. s. d. s. d.	Drabs. s. d. s. d.	Spadonas. s. d. s. d.
Good ...	15 0 to 20 0	17 6 to 27 6	12 6 to 15 0	15 0 to 30 0
Average ...	9 0 to 12 6	15 0 to 17 6	7 6 to 10 0	7 6 to 12 6
Poor ...	5 0 to 8 0	10 0 to 12 6	5 0 to 7 6	2 6 to 5 0

It will be understood that for Special Lots, these quotations may be exceeded.

Wool.—The London Sales opened on Tuesday last, our cable reporting prices fully 5 per cent. higher. This advance has been discounted here already, but the news has had the effect of giving more confidence, and a fair amount of business has been done in the open market at prices fully up to those paid last week, while in some instances the prices paid for super wools, both grease and scoured, were decidedly in sellers' favour. The most important transactions in the open market during the week were our sales of 750 bales, which included amongst other large parcels, a fine clip from the well-known flocks of the Smartt Syndicate, of Ercildoune, Britstown, which comprised 101 bales. The wool was well-grown, of superfine quality, and very carefully got up, and the price obtained was an extreme one. We also sold a specially fine clip grown by Mr. John Roe, of Highlands, for which we obtained the top price paid this season. On the public market yesterday a fair quantity was offered, prices showing no change.

Snowwhite, Extra Superior ...	17d to	18d
Do. Superior	16d „	16½d
Do. Good to Superior...	15d „	15½d
Do. Inferior Faulty ...	13d „	14d
Grease, Super Long, well-conditioned, Grassveldt grown (special clips) ...	7d „	7½d
Do. do. do. ...	6d „	6½d
Do. do. Karoo grown (special clips)	6½d „	7¼d
Do. do. do. ...	5½d „	6¼d
Do. do. Mixed Veldt...	5½d „	6½d
Do. Light, faultless, medium Grassveldt grown ...	5½d „	6d
Do. do. Karoo grown	5½d „	6d
Do. do. short, do.	4½d „	5d
Grease, Coarse and Coloured ...	1½d to	3d
Scoured do. do. ...	2d „	3½d
Basuto Grease, short	5d „	5½d
O.R.C. Grassveldt Grease, long & well-conditioned (special clips)	6d „	6¾d
Do. do. do. ...	5½d „	5¾d
Do. do. medium grown, light, with little fault	5d „	5½d
Do. do. short, faulty & wasty	4½d „	5d
Do. do. Karoo grown, long & well-conditioned ...	5½d „	6d
Do. do. medium grown, light with little fault ...	4d „	4½d
Do. do. short, faulty and wasty...	4d „	4½d

Mohair.—This market continues steady, and a fair amount of business has been done in the open market, chiefly in Winter Hair at 8½d., Winter Kids at 13d. to 13½d., and mixed O.R.C. lots at 8½d. The general tone of the market is healthy, and we hope soon to be able to report a more general demand. On Tuesday's public market a fair quantity was offered, prices showing no change.

Super Kids	16½d to	17½d
Ordinary Kids and Stained ...	12d „	13d
Superior Firsts, special clips	11d „	11d
Ordinary Firsts...	10d „	10½d
Short Firsts and Stained ...	9d „	9½d
Superfine Long Blue O.R.C. Hair	11d „	11½d
Mixed O.R.C. Hair (average)	8d to	9d
Do. very mixed ...	6½d „	7½d
Seconds and Grey	5d „	6d
Thirds	4d „	4d
Winter Kids, special clips ...	12½d ..	13d
Do. good ordinary ...	11d „	11½d
Winter Hair	8d „	8½d
Basuto Hair	8½d „	8½d

Skins are firm. Sheepskins in bundles at 5¼d., and Pelts at 3½d.; Capes 18d.; damaged, 5d. each; Goatskins 12d., damaged, 6d. per lb.; Angoras 6½d., Shorn 5d., damaged 3½d. per lb.; Springbok, 8d. each; Johannesburg Sheep, 4¾d.; Goat, 7½d.; Angoras, 4½d.

Hides.—Sundried, 7½d.; damaged, 6½d.; Salted, 6½d.; damaged, 5½d.; Thirds, 3½d.

Horns.—3½d. each all round.

EAST LONDON.

Messrs. Malcomess and Co., Ltd., report for the month ending November 30th :—

Wool.—Wednesday, 4th November, 1908, can be looked upon as a very important day for the Produce community of our city in that by its being the day whereon the first public auction of wool was held in East London. It marked the beginning of a new era in the annals of our Wool Trade. These Sales have since been, and will be, carried on weekly until further notice. In the light of subsequent events the establishment of Public Sales must be considered a great success, as the following figures will show :—

In the First Sale 2,000 bales were offered of which 800 were declared sold.
„ „ Second „ 2,400 „ „ „ „ „ 1,700 „ „ „
„ „ Third „ 2,800 „ „ „ „ „ 2,100 „ „ „
„ „ Fourth „ 3,000 „ „ „ „ „ 1,800 „ „ „

Most of the unsold Wools were sold after close of Sales by private arrangement. For the first Sales in December nearly 3,900 bales have been catalogued. The success of the Sales is principally due to the active demand which had set in during the month, consequent upon the restoration of confidence in the Wool Trade, as, in consuming centres, opinion seems to be gaining ground that the 1907 wave of depression has passed off, and a revival in trade can be looked for. Superior Skirted, well got up, and bright clean Wools have again enjoyed special favour, which can also be said of the nice clean light Native Wools. Another feature of the Sales has been the keen competition for fine Long Clips of sound, even staple, fully 12 months' growth. Whilst the desire to have Wool has also caused heavy Wools to

be sold in fair quantities, yet the competition for these has not been nearly as keen as for all Super and Light-conditioned Wools. How Wools will fare at Public Auction in a bad and weak market is another question, and has yet to be experienced. Up to the present the result has been most favourable.

Average values made in Sales are as follows :—

Super Long Kaff, Farmers Grease,	Super Hoggetts well skirted	9¾d to 10¼d
„ „ „ „ „	Long 12 months Grease, well skirted ...	8½d „ 9¾d
„ Short „ „ „	well skirted	7½d „ 8⅛d
„ „ „ „ „	unskirted	6½d „ 7½d
Average Kaffrarian „ „	12 months Hoggtets Skirted	8d „ 9d
„ „ „ „	Long Grease, Skirted	7¾d „ 8¾d
„ „ „ „	„ „ Unskirted	6¾d „ 7½d
„ „ „ „	6 months Grease, Unskirted	6d „ 6½d

We quote further :

Super Snow-whites, dry, bright	14d to 14½d
Average do. little yolky, dingy	12½d „ 13½d

	6 months Grease.	12 months Grease.
Aliwal	4d to 4¼d	4¾d to 5¼d
Burghersdorp, Heavy Red	4d „ 4¼d	4¾d „ 5¾d
Burghersdorp, Bluish Stormberg ...	4½d „ 5d	5¼d „ 6¼d
Dordrecht, according to quality & condition	4½d „ 5d	5½d „ 6d
Lady Grey do.	4½d „ 5½d	5d „ 7d
Barkly East do.	4½d „ 5½d	5½d „ 6d
Elliot do.	4½d „ 5½d	5½d „ 6¼d
Molteno, Heavy Reddish	4d „ 4¼d	5d
Molteno, Super Blue, Light	4¾d „ 5¼d	5½d „ 6½d
Queenstown-Tarkastad, Heavy Red	4½d „ 4¾d	5¼d „ 5¾d
Queenstown-Tarkastad, Light Blue	4¾d to 5¼d	5¾d to 6¼d
Cathcart	5½d „ 6½d	5¾d „ 7½d
Stutterheim ...	5¾d „ 6d	6d „ 7d
O.R.C.		
Northern, according to quality & condition	4¾d „ 5¾d	5¾d „ 7d
Reddersburg do.	4d „ 4¾d	5d „ 6¼d
Wepener do.	4d „ 4½d	5d „ 6d
Rouxville do.	4d „ 4½d	5d „ 5¾d
Zastron do.	4½d „ 5d	5d „ 5¾d
Philoppolis do.	4½d „ 5d	5d „ 5½d
Native Grease.		
Transkei average ...	5⅜d to 5⅞d	
Do. Superior Light	6d „ 6½d	
Basuto	5d „ 5½d	

In addition to the Public Auctions ,Sales of Wool by Private Treaty have been fairly large, and fully 5,000 bales must have changed hands in this manner. We reckon at least 15,000 bales of Wool were sold here in November.

Mohair has not undergone any change since last we wrote. Although there has been some enquiry, very little has changed hands as holders are very firm in their asking prices and will not concede anything.

Super Long Blue, of 12 months growth	10½d to 11d
Average Long Blue, of 12 months growth	9¾d
Good Long Blue, Kempy ...	9d
Basuto Hair	8½d to 8¾d
Dockings	3d „ 5d
Genuine Winter Kids	12d
Good Winter Hair	8½d

Hides were inclined to go weaker at the commencement of the month, but the general revival of business seems to have given these an impetus too, and we can now make 7½d.—7¾d. for Sun-dried; 6½d.—6¾d. for Dry-salted.

Sheepskins are firmer in sympathy with Wool and, when in good condition, have made up to 5d.—5¼d. for Good Long Sound Merino Woolled Skins; 3½d.—4d. for all Seconds and Transkei parcels.

Goat and *Angora Skins* are firm, and likely to continue so: 11d.—11½d. for Goat skins; 6d.—6¾d. for Angora skins; 5d. each for Damages.

Horns, 2d. to 4d. each, according to size and quality.

AGRICULTURAL SHOW SEASON, 1909.

FIXTURES AND DATES.

The following dates have been arranged for the Agricultural Show Season of 1909:—

Paarl: Thursday, January 21.
Stellenbosch: Thursday, January 28.
Robertson: Wednesday, February 10.
Malmesbury and Piquetberg (at Malmesbury): Wednesday, Feb. 17.
Queenstown: Wednesday and Thursday, February 17 and 18.
Aliwal North: Tuesday and Wednesday, February 23 and 24.
Western Province (Rosebank): Tuesday, Wednesday, and Thursday, February 23, 24 and 25.
Cathcart: Wednesday, February 24.
Molteno: Tuesday and Wednesday, March 2 and 3.
Caledon: Wednesday, March 3.
Middelburg: Wednesday and Thursday, March 3 and 4.
King William's Town and East London (Combined Show at King William's Town): Wednesday and Thursday, March 10 and 11.
Wodehouse, at Dordrecht: Wednesday, March 17.
Cradock: Tuesday and Wednesday, March 16 and 17.
Grahamstown: Thursday and Friday, March 18 and 19.
Bloemfontein: Tuesday, Wednesday, and Thursday, March 16, 17 and 18.
Port Elizabeth: Tuesday, Wednesday, Thursday and Friday, March 23, 24, 25 and 26.
Oudtshoorn: Wednesday and Thursday, April 7 and 8.
Further dates will be published as they are fixed.

SECOND EGG LAYING COMPETITION.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

RECORD FOR NOVEMBER, 1908, AND TOTALS TO END OF NOVEMBER.

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date. Eggs.	Total per Pen to date. Weight ozs.
1	C. H. van Breda	White Leghorns	1	21	$40\frac{3}{16}$		
			2	22	$41\frac{2}{16}$		
			3	22	$37\frac{8}{16}$		
			4	Dead		468	$867\frac{12}{16}$
2	F. Muller ...	Black Minorcas	5	23	$50\frac{7}{16}$		
			6	15	$31\frac{4}{16}$		
			7	10	$23\frac{5}{16}$		
			8	16	$31\frac{10}{16}$	214	$457\frac{5}{16}$
3	H. Chas. Starke	Buff Orpingtons	9	12	22		
			10	14	28		
			11	17	$30\frac{12}{16}$		
			12	13	$27\frac{7}{16}$	300	579
4	J. W. Wright ...	White Wyandottes	13	12	$22\frac{14}{16}$		
			14	8	$14\frac{14}{16}$		
			15	14	$32\frac{2}{16}$		
			16	14	$28\frac{12}{16}$	251	$519\frac{4}{16}$
5	C. H. van Breda	White Leghorns	17	20	$38\frac{9}{16}$		
			18	22	$40\frac{1}{16}$		
			19	12	$25\frac{2}{16}$		
			20	16	$30\frac{6}{16}$	502	$969\frac{14}{16}$
6	F. T. Hobbs ...	Silver Wyandottes	21	19	$31\frac{6}{16}$		
			22	12	$22\frac{6}{16}$		
			23	9	$16\frac{4}{16}$		
			24	11	$19\frac{10}{16}$	246	$447\frac{13}{16}$
7	H. D. Bradley ...	Silver Wyandottes	25	11	$21\frac{8}{16}$		
			26	13	$24\frac{10}{16}$		
			27	11	$19\frac{7}{16}$		
			28	12	$22\frac{4}{16}$	283	536
8	J. G. Lay ...	White Leghorns	29	22	$39\frac{13}{16}$		
			30	15	$28\frac{4}{16}$		
			31	14	$29\frac{5}{16}$		
			32	22	$38\frac{15}{16}$	416	$812\frac{7}{16}$
9	C. H. van Breda	White Leghorns	33	Dead			
			34	21	$40\frac{3}{16}$		
			35	18	$33\frac{11}{16}$		
			36	16	$28\frac{8}{16}$	435	$825\frac{6}{16}$
10	R. Johnston ...	Buff Orpingtons	37	12	$24\frac{6}{16}$		
			38	11	$19\frac{7}{16}$		
			39	13	23		
			40	8	$14\frac{9}{16}$	262	$485\frac{12}{16}$

RECORD FOR NOVEMBER, 1908, AND TOTALS TO END OF NOVEMBER—*cont.*

Pen No.	Owner.	Breed.	Pullet No.	Eggs.	Weight ozs.	Total per Pen to date.	
						Eggs.	Weight ozs.
11	S. Smith ...	Silver Pencilled Wyandottes	41	3	$5\frac{6}{16}$		
			42	15	$23\frac{12}{16}$		
			43	12	$21\frac{7}{16}$		
			44	18	$31\frac{2}{16}$	261	$441\frac{4}{16}$
12	(Vacant).		...	...	...	...	...
13	S. Smith ...	Brown Leghorns	49	21	$38\frac{2}{16}$		
			50	16	$29\frac{3}{16}$		
			51	21	$36\frac{12}{16}$		
			52	12	$22\frac{2}{16}$	325	$598\frac{5}{16}$
14	Clifford Hoole...	Black Minorcas	53	21	$40\frac{4}{16}$		
			54	19	$26\frac{3}{16}$		
			55	12	$19\frac{2}{16}$		
			56	15	$28\frac{1}{16}$	467	$801\frac{3}{16}$
15	S. Smith ...	White Leghorns	57	23	$41\frac{8}{16}$		
			58	18	$30\frac{12}{16}$		
			59	14	$28\frac{3}{16}$		
			60	20	$35\frac{13}{16}$	476	$870\frac{10}{16}$
16	S. Smith ...	White Leghorns	61	19	$31\frac{8}{16}$		
			62	22	$37\frac{9}{16}$		
			63	20	$39\frac{8}{16}$		
			64	18	$31\frac{1}{16}$	464	$816\frac{12}{16}$
17	W. R. Allen ...	White Leghorns	65	19	31		
			66	17	$37\frac{7}{16}$		
			67	19	$38\frac{8}{16}$		
			68	18	$39\frac{14}{16}$	339	$673\frac{15}{16}$
18	S. Smith ...	White Wyandottes	69	15	$27\frac{12}{16}$		
			70	13	$22\frac{9}{16}$		
			71	15	$32\frac{11}{16}$		
			72	10	19	324	$617\frac{5}{16}$
19	R. W. Hazell ...	Blue Andalusians	73	21	$41\frac{3}{16}$		
			74	20	$36\frac{6}{16}$		
			75	18	$33\frac{3}{16}$		
			76	20	$40\frac{8}{16}$	389	$744\frac{6}{16}$
20	Clifford Hoole...	Brown Leghorns	77	21	$37\frac{7}{16}$		
			78	14	$25\frac{6}{16}$		
			79	13	$24\frac{14}{16}$		
			80	16	$29\frac{11}{16}$	406	$729\frac{4}{16}$
21	R. W. Hazell ...	White Wyandottes	81	12	$24\frac{8}{16}$		
			82	Dead			
			83	12	$24\frac{13}{16}$		
			84	15	$27\frac{12}{16}$	256	$505\frac{4}{16}$
22	S. Smith ...	White la Bresse	85	12	$21\frac{2}{16}$		
			86	8	$14\frac{7}{16}$		
			87	12	$21\frac{10}{16}$		
			88	8	$14\frac{5}{16}$	300	$534\frac{6}{16}$
23	R. J. Williams	Black Minorcas	89	17	$38\frac{14}{16}$		
			90	22	$46\frac{6}{16}$		
			91	12	$24\frac{11}{16}$		
			92	12	$25\frac{12}{16}$	218	$516\frac{7}{16}$

BREEDERS' DIRECTORY & FARMING NOTICES.

Advertisements under this heading are inserted at the rate of 30 words for 2s. 6d., (minimum charge) per insertion, and 6d. per line of approximately six words above that number. Payment must accompany Order. Cheques and P.O.O. to be made payable to the CENTRAL NEWS AGENCY 125-127, Long Street, Cape Town, to whom all communications should be addressed.

OSTRICHES.

SPECIALS ONLY.—Choice pairs, 2 years' old £60 to £100 per pair. Younger birds at lower prices. — F. W. BAKER, Laughing Waters, Willowmore.

OSTRICHES. — Young and old.—For further particulars, apply to Mr. R. S. DE VILLIERS, The Imperial Cold Storage and Supply Co., Ltd., Porterville Road.

PIGS.

BERKSHIRE BOARS.—Pure bred. Ages two to fifteen months. Bred by Charles Leonard, Esq. on his well known "Gloria" Estate—For further particulars, apply to Mr. R. S. DE VILLIERS, The Imperial Cold Storage and Supply Co., Ltd., Porterville Road.

PURE BRED BERKSHIRE PIGS.—Prize Winning Stock. Boars and Sows, £3 each. Also Buff Orpington and White Leghorn Poultry. —Apply MANAGER, Maitland River Farm, Green Bushes Hotel, Port Elizabeth.

CATTLE.

FRIESLAND BULLS, bred from the best IMPORTED stock, from a few weeks to fifteen months old.—For further particulars, apply to Mr. R. S. DE VILLIERS, The Imperial Cold Storage and Supply Co. Ltd., Porterville Road.

GENERAL.

PASPALUM GRASS PLANTS.—Strong roots per Rail or smaller plants per Post to any address. See larger advertisement, page ix. this Journal.—A. C. BULLER, Dwarsriviers Hoek, Stellenbosch.

THE POULTRY YARD.

BUFF ORPINGTONS, SILVER WYANDOTTES, BLACK MINORCAS. Winners of over 90 prizes. Bred for Utility and Show points. PULLETS from 10/-, also COCKERELS from 7/6. Will improve the table and laying qualities of common fowls. Mrs. R. F. DOTT, Kenilworth, Kimberley.

HAZELL, Tregenna, Park Road, Rondebosch. Prize and utility, Andalusians, Brown Leghorns, White and Columbian Wyandottes. Two hundred prizes, including Two Gold Medals and Three Silver Cups. Have pen containing winners last Rosebank Laying Competition. Correspondence invited.

WRIGHT BROS., Highlands, Cape, Breeders of Black and Buff Orpingtons, White and Partridge Wyandottes, Black Langshans and Champion Laying WHITE LEGHORNS. Birds for Sale from 10/6 up. Terms Cash. Birds not approved may be returned. Please Note 400 Birds to select your wants from. Please mention this paper.

WHITE LEGHORNS.—Best American Utility Strains. Settings of Eggs for sale, from pure-bred utility White Leghorns, F.O.R., 10/6 per setting of 15. Cockerels, 10/- to 20/-. Terms, cash with order. Mrs. W. L. STEEL, Stellenbosch.

BUFF ORPINGTONS. — THE FARMER'S FOWL. The fowl that LAYS WHEN EGGS ARE TOP PRICE. A 1 TABLE BIRDS. My Buffs have unlimited orchard and grass run, and are noted for hardiness and good laying qualities. Young stock always for sale at very reasonable prices. Ask for inclusive quotations; carriage paid to any station in South Africa and AT MY RISK to rail destination. My list of prizes won at shows all over South Africa will convince you that this unrivalled *Colonial* strain of 10 years' standing CAN HOLD ITS OWN AGAINST IMPORTED STOCK. Buy hardy Colonial-bred birds and save your pocket. Address: A. C. BULLER, Dwarsriviershoek, Stellenbosch.

ANGORA AND MERINO RAMS.

The following members of the Bedford C.C. Ram Breeders' Association will hold Public Sales of all Rams they breed for Sale (now sold privately on farm), on the Second Thursday in September October, January, March, at 11 o'clock, at Bedford :—

PRINGLE BROTHERS, Glen Thorn, P.O. Linton, Adelaide.
C. W. WEBBER, Havelock Holme, P.O. Bedford.
T. W. KING, Kingsvale, P.O. Bedford.
A. A. HOCKLY, Cullendale, P.O. Bedford.
W. D. HOCKLY, C mmando, P.O. Bedford.
E. J. PRINGLE, Penderny, P.O. Bedford.
KEITH ROSS, Carvers, P.O. Bedford.
PAINTER & LEONARD, Prospect, P.O Bedford.
&c., &c., &c.

All particulars and Catalogues to be obtained from the above.

Clients not being able to attend may place their orders with any of the Breeders, who (on satisfactory reference being given), will buy for them at the Sale.

THOMAS WM. KING, President.
T. C. HALL, Secretary.

Any of the following Books

May be had from J. C. JUTA & Co., at Capetown,

or through their Branches at Port Elizabeth,

Johannesburg, Durban, East London, Grahamstown, Stellenbosch.

☞ The following are some useful Agricultural Books:

Agriculture: (South African Handbook of) by Prof. F. Blersch, Principal of Agriculture and Viticulture, with Preface by J. H. Overman (illustrated)	15/-
Tropical Agriculture. By Nicholls	6/-
Agriculture (Principles of). By L. H. Bailey	5/6
„ Fertility of the Land. By Roberts	6/-
„ Soils and their Properties. By Fream	2/6
„ Soiling Crops and the Silo. By Shaw	5/-
Bees: The A.B.C. and X.Y.Z. of Bee-keeping. By A. J. Root	8/-
British Bee-keepers' Guide Book. By T. W. Cowan. Cloth 3/-. Paper,	1/9
Bee-keeping (Profitable). By Filleul	1/3
Cattle Breeds and Management. (Housman)	4/-
„ Breeding. (Warfield)	10/6
Coffee: Its Culture and Commerce. By C. G. W. Lock	12/6
Diseases of the Ox. By J. H. Steel.	15/-
Dairy Farm in Australia: A Practical Guide for Dairymen, &c.	1/6
Dairy: Chemistry of Dairying. By Snyder	3/6
Ensilage: Being some Notes on the construction and Management of the different kinds of Silos, together with observations on the value of Silage for Farm Stock. By J. F. W. Gatherer	2/-
Farmer's Veterinary Adviser. By J. Law	5/-
„ Complete Grazier. By W. Youatt. New Edition By W. Fream.	32/6
Farm: (Book of the). By H. Stephens. 5th Edition revised in 6 Divisions, No. 1 now ready, each 10/6, or 3 Vols. when complete ..	63/-
Farm Drainage. By H. F. French	5/-
Farm Buildings. By B. R. Scott	12/-
Farm Appliances. By G. A. Martin	2/6
Farm Crops. By John Wrightson	2/6
Farm Crops: Diseases and their Remedies. By Griffiths	2/6
Fertilizers. By E. B. Voorhees	4/6
Feeding Animals. By E. W. Stewart	10/6
Forage Crops. Other than Grasses. By T. Shaw	5/-
Fruit: Californian Fruits. By Wickson	15/-
„ Principles of Fruit Growing. By Bailey	6/-
„ Australian Fruit Culturist. By Crighton	12/6
„ Citrus Fruits and their Culture. By H. H. Hume	15/-
Plums and Plum Culture. By F. A. Waugh	7/6
Gardening (Amateur) Guide for Amateur Gardeners in Cape Colony. By G. B Van Zyl, F.N. A.G.A.	2/6
„ Vegetable (Principles of). By Bailey	5/6
„ Gardeners' Dictionary By Johnson	11/-
Horses and Stables. By Fitzwygram	3/6
Horse (The). By Youatt	7/6
Horse Breaking (illustrated) By Capt. Hayes	14/-
Stable Management. By Capt. Hayes	14/-
Veterinary Notes for Horse Owners. By Capt Hayes	18/-
Hints on Horses. By Major Young	1/3
Irrigation Farming. By L. M. Wilcox	10/6
Irrigation and Land Drainage. By L. B. Cox	6/-
Irrigation: Water Rights under the Common Law and the Irrigation Act (No. 32 of 1906). By Sir H. Juta, K.C.	30/-
Manures and Manuring. By C. H. Aikman	6/6
Manures and their Uses. By Griffiths.	2/6
Manures for Fruit and other Trees. By Griffiths	9/-
Milk, Butter and Cheese. By J. Oliver	7/6
Milk: Its Production and Uses. By E. T. Willoughby	7/-
Sheep: Varieties and Management. By Armatage	1/3
Sheep and their Diseases. By Rushworth	7/6
Tobacco Culture. By C. G. W. Lock	12/6
Tobacco Leaf: Its Culture and Cure. By Killikrew and Myrick	12/6
Tobacco Culture. By G. M Odlum, Department of Agriculture, Rhodesia (illustrated)	2/6
Tobacco Culture. By Orange Judd	2/6

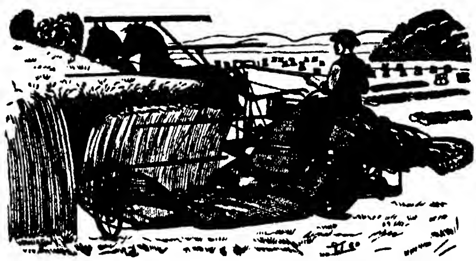
POSTAGE IS EXTRA.

Complete Catalogue will be sent GRATIS on application.

MASSEY HARRIS
HARVESTING MACHINERY

MASSEY-HARRIS WIDE-OPEN BINDER.

The Lightest in Draught.



6 feet and 7 feet Cut.

R. M. ROSS & CO., AGENTS, CAPE TOWN.

MASSEY HARRIS—BINDERS.
MASSEY HARRIS—REAPERS.
MASSEY HARRIS—MOWERS.

Also

Fruit Growers Requisites,
Spray Pumps.
Disparene which is a Pure Arsenate of Lead.
Sulphate of Copper.
Sulphate of Iron.

Price List and Catalogues sent to any Address.

R. M. ROSS & CO.,
STRAND STREET, CAPE TOWN.